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NEUROPSYCHOLOGICAL AND POWER SPECTRAL EEG CHARACTERISTICS OF EXHIBITIONISTS: A CEREBRAL MODEL OF SEXUAL DEVIATION

by

© LINDA L. BAKER

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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L

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Supervisor

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Date May 10, 1985

Dedicated to

Edward

who patiently and lovingly,

lived through yet another

dissertation.

ABSTRACT

The present study investigated a proposed cerebral model of sexual deviation (Flor-Henry, 1980) as it applied to a group of arrested, male exhibitionists (n=23). The rationale for the present study was based on the failure of traditional theories to satisfactorily explain the origins of exhibitionism (Blair & Lanyon, 1981; Myers & Berah, 1983), and the known relationship between sexual behavior and the brain (Dimond, 1980; Flor-Henry, 1980; Kolarsky et al., 1967).

Relative to normal males, exhibitionists were predicted to display left-temporal lobe dysfunction and interhemispheric perturbance on relevant neuropsychological and electroencephalograph measures. The controls (n=91) for the neuropsychological tests were an age and sex appropriate subset from a prior normative study (Fromm Auch & Yeudall, 1982). The EEG controls (n=19) were a separate group of males matched for handedness and age with the 19 exhibitionists who had a power spectral EEG.

The results provided partial support for the cerebral model of sexual deviation proposed by Flor-Henry (1980). The neuropsychological results indicated that exhibitionists made significantly more errors on neuropsychological indices reflecting left-temporal functions than did controls (i.e., Williams Verbal Learning, Speech Sounds Perception) ($p \leq .01$); whereas no significant differences were evidenced between the groups on test scores reflecting right-temporal functions. Moreover, the Rey Auditory-Verbal Learning Test (AVLT), a left-temporal measure revealing immediate memory, retention, learning strategies and learning problems, indicated that the exhibitionists had difficulties distinguishing or maintaining a distinction between external information and subjective experience. This processing problem was not evidenced in a group of apprehended, assaultive males. The EEG results also indicated significant differences between exhibitionists and controls on measures expected to affect left anterior and posterior brain functioning (i.e., anterior --> posterior left intrahemispheric phase, left --> right interhemispheric phase crossed, log right/left anterior power, log right/left posterior power) for the eyes open condition in the alpha frequency ($p \leq .005$). This finding indicated reduced neural inhibition in the left-frontal lobe relative to the right in exhibitionists, and was also evidenced to varying degrees for the theta and beta frequencies. There were no significant findings to support the prediction of interhemispheric perturbance. The EEG measure selected to assess interhemispheric functioning showed a trend towards deviational right/left energy shifts in exhibitionists; however, this trend did not represent a significant deviation from controls ($p \leq .08$). Similarly, a comparison of single and both hand performances on neuropsychological motor indices did not reveal predicted interhemispheric dysfunction in exhibitionists.

Discussion of the results addressed theoretical and applied implications, as well as limitations of the present study and directions for future research.

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CHAPTER I

INTRODUCTION

The sexual disorder of exhibitionism has largely been studied from psychodynamic and learning perspectives. The result has been a vast literature on exhibitionism pertaining to personality, socio-familial characteristics, sexual descriptors, and behavioral treatments. Despite the accumulating literature, neither of the former theoretical perspectives have yielded sufficient or conclusive empirical backing (Blair & Lanyon, 1980; Heath, 1978; Rooth, 1971). There are wide discrepancies in reported personality characteristics, and various factors credited with etiological significance, most of which do not appear to be related across studies. Positive short term effects have been achieved with some behavioral treatments (Cox & Daitzman, 1980). However, successful treatment approaches have not yet revealed the causes of exhibitionism, nor even the specific components of therapy which have alleviated exposing behaviors (Maletzky, 1980).

The identified discrepancies in the literature may be reconciled to some extent by forming exhibitionist subgroups based on the presence of other criminal offences, or the number of exposure charges (McCreary, 1975; Forgac & Michaels, 1982). Such classification systems may be valuable in selecting treatment approaches, but do not appear to increase our etiological understanding of exhibitionism. It is possible that the most appropriate classification system, or the key personality or socio-familial descriptors have not yet been identified. A plausible alternative is that the etiology of this sexual deviation will not be discovered by searching only for commonalities among personalities and personal-social histories of exhibitionists.

The failure to develop an adequate model of exhibitionism over the last century warrants, if not necessitates, a significant shift in focus. One apparently appropriate alternative is a proposed cerebral model of exhibitionism. Such a model is based on the premise that gender, psychopathology and cerebral organization are linked (Flor-Henry, 1978). Initial evidence is provided by the relationship reported between temporal lobe epilepsy and sexual perversions (Epstein, 1961; Hooshmand, 1969; Kolarsky, Freund, Machek, & Polak, 1967; Mitchell, Falconer, & Hill, 1954).

The present study investigated a possible cerebral basis to exhibitionism by examining neuropsychological and neurophysiological characteristics, postulated to be related to temporal lobe and interhemispheric functioning, in an identified sample of male exhibitionists relative to normal male comparison groups.

CHAPTER II

SELECTIVE REVIEW OF THE LITERATURE

Review of the Literature on Exhibitionism

Nature of the Problem

In 1877, Lasègue made the first attempt to classify genital exposure as a condition within the medical field (cited in Rooth, 1971). He described seven cases which showed the following commonalities: men of good character who inexplicably experienced powerful urges to display their genitals with no attempt to engage in further sexual activities, and little attempt to avoid capture. The term Lasègue coined for this condition was "l'exhibitionnisme."

Exhibitionism is currently classified as a paraphilia. The term paraphilia refers to any sexual disorder in which "bizarre imagery or acts become necessary or preferred for sexual excitement or release of sexual and non-erotic tension" (Webb, DiClemente, Johnstone, Sanders, and Perley, 1980, p.106). The actual definition of exhibitionism provided in the Diagnostic and Statistical Manual of Mental Disorders Third Edition (DSM-III) (1980, p.272) is as follows:

> the repetitive acts of exposing the genitals to an unsuspecting stranger for the purpose of achieving sexual excitement, with no attempt at further sexual activity with the stranger.

This description rules out instances of exhibiting which are viewed as appropriate, such as pre-coital sex play, nudity in designated areas, and non-genital ostentatious behavior. In keeping with the literature, the terms "exhibitionism," "indecent exposure," and "exposure" will be used interchangeably throughout this thesis.

The DSM-III criteria do not implicate gender. However, most authors report that exhibitionism occurs "exclusively" in males (McConaghy, 1982; Mohr & Turner, 1967; Rickles, 1950) or "almost exclusively" in that sex (Gayford, 1981; Henninger, 1941; Smith, 1980; Tollison & Adams, 1979). The very few reported cases of female exposure occurred within the context of other disorders (e.g., obsessional anxiety, hysteria) (Stekel as cited by Karpman, 1957); or as a purely attention-seeking activity (Hollander, Brown & Roback, 1977). These clinical pictures are not typical of male exhibitionists, who are largely described as having normal personality profiles (Radar, 1977), and as seeking sexual excitement as opposed to attention (DSM-III, 1980). Regardless of whether exhibitionism as a paraphilia occurs in women, the present study will focus on males because no females were referred to the clinic through which the participants were contacted. This apparent preponderance of males was also reflected in the literature: no female cases were referenced or included in any of the experimental studies reviewed. In summary, the fact that the present sample is exclusively male, is congruent with the literature on genital exhibitionism, and supports the premise that this paraphilia is peculiar to males.

The English Common Law made sexual exposure in public a crime, even before public indecency was prohibited by statute in 1824 (Smith, 1980). Indecent exposure continues to be an offence in Western countries via statutes comparable to, and including Sections 169 (indecent act) and 170 (nudity) of Canada's Criminal Code (Heath, 1978). Criminal records provide the best source of statistical data on exhibitionism since no general population figures exist (Mohr & Turner, 1967; Rooth, 1971).

In terms of incidence, estimates suggest that exposure accounts for one-third of all recorded sexual offences in Canada (Mohr, Turner & Jerry, 1964), the United States (Smukler & Schiebel, 1975) and England and Wales (Radzinowicz, 1957). Recidivism rates vary from 17 to 25 percent (Tollison & Adams, 1979). Males falling into this diagnostic category are estimated to comprise the second most common sexual deviation which presents itself at mental health facilities in England (Bancroft, 1976). Yet the actual incidence of exhibitionism is believed to be greatly underestimated. Possibly only about 17 percent of all exposure incidents are ever reported to the police (Cox & MacMahon, 1978; Gittleson, Eacott & Mehta, 1978), and typically police reports precede possible charges and subsequent criminal records.

Surveys of female medical and nursing students in Britain, and female college students in the United States, both indicated that between 30 and 40 percent had been victims of exhibitionism (Cox & MacMahon, 1978; Cox & Maletzky, 1980; Gittleson et al., 1978). Cox and Maletzky extrapolated these findings to an estimated United States female population of 110,000,000, which suggested that 35,200,000 females have been victimized by exhibitionism. Although existing research suggests that only a minority of all the victims may be significantly traumatized by the incident, in absolute numbers it represents thousands of affected females (Cox & Maletzky, 1980).

The marked prevalence of this paraphilia represents a costly personal and social problem within Western cultures. Exhibitionists are likely to experience guilt feelings, social embarrassment, familial strife, criminal records, as well as a sundry of related consequences. Victims may experience significant trauma and require brief psychotherapy. As a result, society is straddled with heavy legal and treatment costs in its attempt to control what is generally considered a public nuisance. Yet apart from the growing literature on behavioral treatments, very little empirical research exists to substantiate theory, or link theory to treatment in the area of exhibitionism (Blair & Lanyon, 1981).

Descriptive Characteristics of Exhibitionists

Numerous studies have been published on the personality, sociosexual development and familial histories of exhibitionists (e.g., Karpman, 1957; Mohr, Turner & Jerry, 1964). The purpose of these studies was to discover similarities among exposers which differentiated them from nonexposers, in order to increase our etiological understanding of this sexual deviation. The vast majority of this literature consists of clinical descriptions based on interviews and diagnostic impressions (e.g., Apfelberg, Sugar & Pfeffer, 1944; Arieff & Rotman, 1942; Gebhard, Gagnon, Pomeroy & Christienson, 1965; Henninger, 1941; Hirning, 1945; Radzinowicz, 1957; Rosen, 1964; Taylor, 1947), with only a few studies having utilized objective personality assessments (e.g., MMPI) (Forgac & Michaels, 1982; Langevin, Paitich, Ramsay, Anderson, Kamrad, Pope, Geller, Pearl & Newman, 1979; McCreary, 1975; Moncrieff & Pearson, 1979; Radar, 1977; Smukler & Schiebel, 1975).

Some authors have identified common descriptors across selected studies on exhibitionism (Karpman, 1957; Blair & Lanyon, 1981); however, within this literature a plethora of etiological factors have been hypothesized which contain wide discrepancies in reported personality characteristics of exposers. The present section will review some general descriptors, delineate some of the more striking contradictions, and then examine some classification systems which have been proposed to reconcile existing discrepancies in the literature on exhibitionism.

The onset of exposing is generally accepted as occurring in mid-adolescence or the mid-twenties (Mohr et al., 1964). Despite the early onset, most studies of exhibitionism have included men between 20 and 50 years of age, the majority being between 20 and 40 (e.g., Apfelberg et al., 1944; Arieff & Rotman, 1942; McCreary, 1975; Mohr et al., 1964; Radzinowicz, 1957).

Various writers have identified the following as etiologically relevant: (1) unassertive, passive personality (Apfelberg et al., 1944; Hirning, 1945; Rooth, 1971); (2) feelings of inferiority and inadequacy (Apfelberg et al., 1944; Mohr et al., 1964; Rosen, 1964); (3) low frustration tolerance (Mohr et al., 1964); (4) difficulty expressing anger (Jones & Frei, 1979; Hackett, 1971); (5) controlling parent—often an aggressive mother (Apfelberg et al., 1944; Karpman, 1957; Mohr et al., 1964); (6) serious personality maladjustment (Arieff & Rotman, 1942; Henninger, 1941); (7) normal personality adjustment (Langevin et al., 1979; Radar, 1977; Smukler & Schiebel, 1975); (8) obsessionality (Rickles, 1950; Rooth, 1971); (9) premeditated nature of exposing

(Gebhard et al., 1965); (10) alcohol problems (Shaskan, 1939); (11) absence of alcohol (Gebhard et al., 1965); (12) masturbation frequency and unusual fantasies (Evans, 1970; Gebhard et al., 1965; Taylor, 1947); (13) puritanical home attitudes regarding sexual matters (Apfelberg et al., 1944; Rooth, 1971); (14) precipitating stress often related to interpersonal relationships (Blair & Lanyon, 1981; Mohr et al., 1964).

Although some variables are identified by more than one author, the above list suggests that different descriptors have been causally linked to exhibitionism at different times for different groups of exposers. One theme that is common to many of the dispositions or descriptors postulated above, is an abnormality or difficulty in handling or expressing aggression or dominance. The identification of this theme may be significant, but it does not answer the important question of why exhibiting should be adopted as a means of coping.

Masturbation habits and fantasies seem to be another important area in describing and differentiating exhibitionists. Gebhard et al. (1965) compared the masturbation habits of 135 exposers to 11 other offender groups (sexual and nonsexual). The results showed that the exhibitionist group had a significantly greater number of unusual masturbation fantasies, and a significantly higher frequency of masturbation to orgasm. These findings became more impressive in light of two additional findings: (1) next to homosexuals, exhibitionists reported the lowest total reliance on coitus for sexual gratification; and yet (2) exhibitionists also reported the second highest frequency of coital activity. Together with the previous information, these findings suggest that exhibitionists have a higher than average frequency of masturbation and unusual masturbation fantasies, and that masturbation does not seem to be used merely as a replacement for a lack of coital activity. Moreover, Evans (1970) found exhibitionists with deviant masturbatory fantasies to be harder to treat with aversive conditioning than those without deviant masturbatory fantasies.

There are conflicting reports in the literature regarding the general personality adjustment of exhibitionists. Some early authors concluded from clinical data that exhibitionism is related to serious personality maladjustment (Arieff & Rotman, 1942; Henninger, 1941). Others, using objective assessments such as the Minnesota Multiphasic Personality Inventory (MMPI), have concluded that the mean profile for exhibitionists is largely, if not entirely, within normal limits (Langevin et al., 1979; Radar, 1977; Smukler & Schiebel, 1975).

Discrepancies also exist regarding the assumption of an obsessional characteristic of exhibitionists. Rickles (1950) and Allen (1962) viewed exhibitionism as a compulsive-obsessive neurosis, whereas East (1946) indicated that obsessional symptoms were rare, and Taylor (1947) identified only two compulsive-obsessive neurotics out of a sample of 98 exposers. The others in Taylor's sample showed no real effort to control the impulse nor any real distress at giving way to the desire. From the psychoanalytic perspective, Allen (1980) suggested that the dynamics operating in the development of neuroses and perversions are totally reversed. That is, infantile sexual drives are overly repressed during psychosexual development in the neuroses, and not repressed enough in perversions. Gebhard et al. (1965) estimated that 86 percent of exposure incidents are premeditated, which would certainly argue against classical obsessional diagnoses. The latter suggestions, as well as the objective assessments indicating no personality pathology, suggest that exhibitionism is not a compulsive-obsessive disorder.

The extent of alcoholism and antisocial tendencies in exhibitionists also varied across studies. The reported incidence of alcoholism ranged from 50 percent (12 out of 24) to 25 percent (15 out of 60) (Shasken, 1939 and Hirning, 1945, respectively). Based on a survey of 135 exhibitionists, Gebhard et al. (1965) estimated that less than 14 percent of all exposure incidents occurred in a state of drunkenness. Myers and Berah (1983) reported that only 4 percent (2 out of 45) of their exposer sample were intoxicated at the times of their offences.

Estimates of prior sexual offences other than exhibitionism varied from 2 percent (Hirning, 1945) to 20 percent (Evans, 1970). Similarly, estimates of prior non-exposing convictions, both sexual and nonsexual, ranged from 19 percent (Taylor, 1947) to 66 percent (Arieff & Rotman, 1942).

Classification systems have been proposed to attempt to organize the wide variety of descriptors reported in the literature on exhibitionism (Rickles, 1950; Rosen, 1964; McCreary, 1975; Forgac & Michaels, 1982). As one exemplar, McCreary (1975) examined personality characteristics as a function of chronicity of exhibiting. Mean group MMPI profiles and Golberg's (1972) deviant versus normal and sociopathic versus psychiatric indices were computed and compared for the following three subgroups of exposers: (1) no prior arrests (N=37); (2) 1 to 5 prior arrests (N=38); (3) 6 plus prior arrests (N-10). Golberg's formula to differentiate deviant from normal group profiles, using T-score equivalents of K-corrected raw scores, is as follows: Hs (Hypochondriasis) + 2Pd (Psychopathic Deviance) - Ma (Hypomania). A score greater than 123 is in the deviant range. The second formula, which cuts across deviant versus normal ranges to differentiate psychiatric from sociopathic group patterns, and also uses T-score equivalents of K-corrected raw scores, is as follows: 2Pd - Hy (Hysteria) - Sc (Schizophrenia). A score greater than 10 is in the sociopathic range. The results indicated that first offenders had relatively normal personality profiles, and were classified as normal and psychiatric on Golberg's diagnostic indices. In contrast, the more chronic offenders (6 plus arrests) produced highly elevated profiles indicating impulsivity, irritability, distrust, estrangement and sexual adjustment problems. Classification according to Golberg's formulae indicated that the chronic offenders were both deviant and sociopathic. The group MMPI profile for the intermediate chronicity group (1 to 5 arrests) was between that of the chronic and first offender groups.

The number of prior arrests for indecent exposure is frequently not reported in the literature. However, some support for McCreary's model is provided by Taylor (1947) and Hirning (1945); neither author reported serious personality maladjustment, and prior arrests for exposure were 38 percent (23 out of 60) and 24 percent (23 out of 98) respectively.

A major problem with McCreary's model would appear to be that the number of arrests does not necessarily correlate with chronicity or frequency of exposure. Four clients in the forensic clinic where the present author works, were arrested for the first time after 6 to 15 years of periods of frequent exposure.

Two basic typologies frequently described in the literature are the neurotic and the antisocial type of exhibitionist (Rickles, 1950; Rosen, 1964). Forgac and Michaels (1982) postulated that these two types of exposers could be distinguished on the basis of their nonexhibitionistic criminality. In contrast to McCreary, these authors focused on arrests for illegal activities other than exposing. Exhibitionists with Criminal involvement were labeled the "criminal type" as opposed to the "pure type." These authors studied 84 exhibitionists, 54 criminal types and 30 pure types. Using Rodgers Condensed CPI-MMPI (Rodgers, 1966), K-corrected MMPI scale scores and CPI scale scores were computed. The criminal group showed significantly greater pathology than did the pure group. Moreover, Golberg indices classified the pure group within the normal range and the criminal group within the deviant and sociopathic range.

Although these results support the possible classification of exposers according to presence or absence of other criminality, the nature of the personality differences predicted by Forgac and Michaels to separate pure from criminal types only received limited support. It may be that the exact nature of the personality differences between pure and criminal types has yet to be delineated, or it may be that such a criterion alone cannot reconcile the wide discrepancies in the literature on exhibitionists.

Summary. The substantial literature pertaining to the personality, socio-familial, and sexual descriptors of exhibitionists has been characterized by wide discrepancies in reported personality characteristics, and a variety of factors credited with etiological significance, most of which do not appear to be systematically related across groups studied. Reactions to and the expression of anger and dominance appear to be common themes relating a number of descriptors. Deviant masturbatory fantasies and the role of masturbation were identified as potentially distinguishing variables between exhibitionists and other offender groups, as well as between exhibitionists who responded and did not respond to aversion therapy.

Some of the identified discrepancies in the literature may be reconciled by classification of exhibitionist subgroups according to the presence of other criminal offences, or the number of exposure offences. Although potentially valuable for selecting treatment approaches, such classification systems do not appear to increase our etiological understanding of exhibitionism. There is always the possibility that the most appropriate classification system has not been developed, that assessment instruments are not sensitive enough, or that researchers and therapists have not identified the key personality or socio-familial descriptors. A plausible alternative is that the personalities and personal-social histories of men suffering from exhibitionism are truly varied, at least between subgroups of exposers, and that the key to the etiology of this paraphilia will not be uncovered by a focus on only such variables. Certainly the lack of success over the last 100 years in developing an adequate model of exhibitionism warrants, if not necessitates, a significant shift in focus. A promising realm which the present study will explore is that involving neuropsychological and neurophysiological characteristics of exhibitionists. At the same time, wide discrepancies in the literature to date illustrate the importance of thorough identification of the present sample in order that relevant comparisons can be drawn to past and future research efforts.

Theoretical Approaches

Exhibitionism has been traditionally studied from psychoanalytic and learning perspectives, with biological and physiological paradigms receiving attention only very recently (Cox & Daitzman, 1980; Heath, 1978; Rooth, 1971).

Psychoanalytic Perspective. According to a psychoanalytic viewpoint, the two key factors in the development of a perversion, such as exhibitionism, are enhancement of infantile sexuality, wherein the normal repression of infantile sexual drives during psychosexual development does not occur; and disturbances in psycho-sexual development with early object relationships (Rosen, 1964). The result is that the elements of infantile sexuality are not sufficiently integrated into adult sexuality at puberty. Lack of integration resulting from insufficient repression, may result in the infantile component attaining primacy as a fixed perversion, e.g. exposing, or remaining as an alternative sexual mode under slight regressive stress (Allen, 1980).

Allen further explains the nature of disturbed psycho-sexual development as follows. The infant's display of nurturing needs, as well as the fulfillment of those needs are thwarted or overwhelmed by the primary caretaker in the oral period. This disturbance predisposes the child to greater stress and conflict in the separation-individuation phase, impairs comfortable appropriate gender-identity beginnings, and renders him especially vulnerable to castration anxieties. For example, the child is likely to be overly threatened by genital differences between the sexes, by adult sexual or aggressive behavior, and by his own erotic and hostile impulses. During the phallic-oedipal stage the child usually experiences a voyeuristic-exhibitionistic incident that is so exciting and stressful, that further developmental transitions are retarded. Finally, during the latency period, the stage for the perversion is completed by some traumatic event, frequently of an incestuous nature (Karpman, 1957), which serves to write the script for the fantasy that directs the perversion.

From the current psychoanalytic perspective, exhibitionism serves both sexual and nonsexual functions (Rosen, 1964; Allen, 1980). In terms of nonsexual functions, it is postulated to regulate self-esteem by defending against anxiety, depression and object-loss, as well as to express fear and anger toward women. The sexual functions include sexual gratification, and defences against castration anxieties, narcissitic injuries, and gender-identity insecurities.

Learning Perspective. The basic assumptions underlying most behavioral conceptualizations of exhibitionism are that the deviant sexual behavior (i.e., exposing) has been learned, is being maintained by current events, and can be changed by teaching new patterns of behavior.

Based on 45 case histories, McGuire, Carlisle and Young (1965) offered their own specific hypothesis regarding the etiology of sexual deviations. They postulated that an initial seduction or deviant experience plays its part by supplying a fantasy for later masturbation. Masturbation to a fantasy derived from a deviant sexual experience would then strengthen the stimulus value of that deviant experience. The authors suggested that the deviant event was for those subjects the first real sexual experience, as opposed to stories from others or fantasy material from books, thus giving the incident a strong stimulus value as fantasy material. The further step of masturbation to the fantasy was offered as an explanation of why all persons do not eventually develop deviant behaviors. Unfortunately, McGuire and his colleagues did not compare the sexual histories of their paraphilia group to a control group of men without sexual deviations; therefore, the theory was not tested. However, a survey of the relevant literature suggests this theory as presented is inadequate: case studies reported in the literature (Karpman, 1957) indicated that not all men with sexual deviations reported a deviant sexual experience prior to the onset of their deviant behavior; and that men who reported a similar traumatic sexual experience often developed different deviant behaviors.

Bandura (1969) identified three social learning situations which provide a general etiological framework for sexual deviations. First, he stressed the early parental modeling of deviant sexual behavior patterns. Second, he postulated that responses elicited by the "deviant sexual modeling" become endowed with positive sexual valence, and effect well-developed behavior patterns long before the onset of puberty. Third, parents facilitate the maintenance of deviant responses by direct or vicarious reinforcement. The fact that frequently only one male child within a family would respond to deviant parental modeling and reinforcement patterns, suggests that constitutional factors or individual differences must also play a key role in the development of sexual deviations. Although this is compatible with Bandura's (1977) theory of social learning, since he proposes a triadic reciprocal system including person, environment and behavioral components, a critical question is still left unanswered by such behavioral approaches: i.e., what "personal factors" cause an individual to be vulnerable to environmental conditions linked to the genesis of sexual deviations?

A possibility advanced by Barlow and Abel (1976) is that deviant persons may have adequate heterosexual skills but experience low heterosexual arousal, or may have adequate arousal but be unable to act owing to a lack of skills. This type of conceptualization belongs to a set of theories which oppose early behavioral formulations (e.g., Kanfer & Phillips, 1970), in favour of the following premise: cues and reinforcers relevant for one exhibitionist may differ from those that affect another (Abel, Blanchard, Barlow, Mavissakalian, 1975).

Studies suggesting that aversive therapy does not reduce sexual behavior such as exhibitionism by weakening the primary sexual drive that originally motivated the behavior, lead McConaghy (1982) to postulate the following:

> that a neurophysiological behavior-completion mechanism is established in the nervous system when an act becomes habitual, and that it is this behavior completion mechanism that assumes responsibility for motivating the completion of the habitual act, rather than the primary drive that originally motivated the act. If the act is interrupted prior to completion, the behavior completion mechanism activates the arousal system. The resulting high arousal is experienced by the subject as tension or anxiety and is sufficiently aversive to encourage him to complete the act, even if he does not wish to do so (p.692).

Biological Perspective. A biological hypothesis of exhibitionism was presented by Jones and Frei in 1979. They postulated an innate disposition to exhibit which becomes subjected to learning experiences. Evidence was given to suggest (1) that exhibitionists have difficulty with and show abnormality in the handling of aggression or dominance; and (2) that penile display is an archaic mechanism for the expression of hostility.

Analogies of penile display in non-human primates included the Squirrel Monkey, who displays the erect penis under conditions of courtship, aggression, social greeting, and to its own reflection in a mirror; and the Proboscis Monkey, who uses the erect penis to alert others of the presence of a foreign troop, and to warn against intrusion. Anthropological examples included the Asmat and Anyu males of New Guinea, who respond with a penile display dance when frightened, elated or surprised; Java and New Guinea totems which incorporate an erect penis on the gatepost of dwellings, facing outwards to protect the residents from harm; and Japanese amulets incorporating an erect penis which are worn to ward off danger.

It is suggested that in man the disposition is made explicit by experiencing some chance event involving penile display in a sexual context, and this experience triggers off repeated acts in the stereotyped form, the mechanism being analogous with imprinting in birds (Jones & Frei, 1979). Thus, the biological model proposes an innate mechanism for exposure, with a neuro-anatomical circuitry for the behavior and some specific neuronal facilitation for its learning, as in imprinting.

Physiological Perspective. In an extensive literature review, Blair and Lanyon (1981) cited physiological approaches as one of the major theoretical perspectives for understanding the etiology of exhibitionism. At the same time, they concluded that "research of a physiological nature is now appearing, but it has yet to address exhibitionism directly" (p.456). This conclusion is aptly illustrated by the absence of any references to physiology, hormones, chemotherapy, neurophysiology, neuropsychology, electroencephalograms, or cerebral functioning, in the subject index of what is judged to be the most comprehensive and well researched book on exhibitionism to date (see Cox & Daitzman, 1980).

The evidence relating cerebral organization and functioning to sexual deviations in general will be discussed in a subsequent section. This very short discussion will focus on the little physiological information discovered in reference to indecent exposure.

Langevin et al. (1979) examined the premise that exhibitionists are hypersexual by comparing testosterone levels and penile volume with nondeviant controls. A blood assay indicated the opposite; a trend for exposers (N=17) to be hyposexual compared to normals. However, this finding was not replicated in a subsequent group of exposers. Penile volume was assessed by measuring the six largest reactions to erotic movies. Exhibitionists were not found to be more reactive than controls.

Saba, Salvadorini, Galeone, Pellicano, and Rainer (1975) treated four mentally retarded subjects who exposed with the antiandrogen cyproterone acetate (CPA). Exhibitionistic behavior disappeared, but reappeared 15 to 20 days after CPA administration was terminated. Others have reported successful treatment of exposers with antiandrogens (Bancroft, Tennent, Loucas & Cass, 1974; Money, 1970), but no conclusive data has been presented thus far.

Comment on Theoretical Approaches

It is apparent that the major traditional theories of exhibitionism; psychodynamic and learning theories, lack sufficient and conclusive backing (e.g., Blair & Lanyon, 1981; Heath, 1978; Myers & Berah, 1983; Rooth, 1971). It is true that learning theories have been particularly fertile in their genesis of therapeutic interventions (Cox & Daitzman, 1980). However, the fact that learning theories have also failed to yield direct empirical data to support causal explanations, is clearly reflected in Maletzky's (1980) concluding remarks on behavioral interventions for exhibitionism: "In its treatment, we may discover its causes" (p.246).

Though intriguing, biological and physiological perspectives have received the least theoretical attention, and appear to lack any sort of empirical backing at this time. However, it seems worth noting (1) that a prominent behaviorist, McConaghy (1982) has postulated that a neurophysiological mechanism underlies exhibitionism and sexual deviations in general; (2) that authors who have published on the effectiveness of a behavioral intervention, e.g., Jones and Frei (1977) subsequently published a biological theory proposing a neuro-anatomical circuitry for exposing behavior and neuronal facilitation of its acquisition (Jones & Frei, 1979); and (3) that Myers and Berah (1983) recommended that the possibility of some form of organic instability be investigated.

Current Treatment Approaches

Relatively little has been published about nonbehavioral approaches for treating exhibitionists (Hackett, 1971; Mathis, 1980; Mathis & Collins, 1970; Mohr, et al., 1964; Silver, 1976). The most comprehensive exemplars of individual and group approaches have been offered by Hackett and Mathis, respectively.

Hackett (1971) developed an approach to individual psychotherapy after individually treating 37 exhibitionists. His patients ranged in age from 17 to 45 years, with a mean age of 26 years. Sixteen were single. Seventeen had previous arrests for exhibiting. Based on his work, Hackett postulated that the key conflicts underlying exhibitionism involved the awareness and discharge of anger. Using an approach which combined confrontation with support and information giving, Hackett identified three phases in his therapeutic process: (1) therapeutic endorsement by the patient; (2) demonstration by therapist of a causal relationship between anger and subsequent exposing; and (3) acquisition of alternative means of coping with anger.

The follow-up checks ranged from 2 to 14 years, and involved two methods; (1) contacting the patient by telephone or by letter; and (2) checking both state and federal arrest records for the United States of America to determine whether the patient had reoffended. Thirty-four patients indicated no subsequent exhibition at follow-up, which was supported by a lack of further arrests. Two of the three therapeutic failures in terms of recidivism were described as aggressive-assaultive exposers, that is, men who expose with the aim of producing a maximum amount of shock and terror. The third was not viewed as any different from those who were successful in treatment, other than the fact that the individual never appeared to have entered into a therapeutic alliance.

Mathis (1980) described a group treatment program founded upon three basic criteria: (1) mandatory attendance; (2) a treatment goal and symptom common to each patient; and (3) male and female co-therapists. A group context was selected because he felt the mechanisms of denial, intellectualization, and isolation could be handled best in a setting in which the exposer was faced by others with varying degrees of experience with the condition. The opportunity to exhibit verbally before a group of sympathetic listeners that included a female therapist was expected to be benefical. The presence of a male and female therapist was to simulate a family setting much the reverse of the earlier pattern most patients had known: a male in the dominant leadership role and a female in an understanding, more passive role.

Six treatment phases were identified as follows: (1) denial; (2) acceptance; (3) anger; (4) disappointment; (5) upward movement; and (6) separation. Mathis and Collins (1970) reported that 17 men had graduated from the group and 15 were still in treatment. They indicated that graduates were frequently kept on as consultants in the group and remained in contact with the therapists. Unfortunately, systematic follow-up data were not presented.

Behavioral Treatments. Behavioral interventions have dominated the literature on exhibitionism since the 1960's. A wide range of treatments have been advocated, the majority of which have focussed on associating exposing with an aversive condition, such as shock, noxious odor, or shame (Cox & Daitzman, 1980). Although the short term effects of these behavioral approaches appear to be promising, reviews of this literature by Blair and Lanyon (1981) and McConaghy (1982) indicated that there is a lack of controlled evidence for many advocated techniques. The most common inadequacies are (1) the lack of between-group or within-subject control procedures; (2) the confounding of multiple-treatment techniques; (3) the reliance on purely anecdotal data; and (4) the general lack of detail about methodology.

An extensive review of the behavioral literature is beyond the scope of this thesis. The reader is referred to Blair and Lanyon (1981), Cox and Daitzman (1980) and McConaghy (1982). The purpose of this section will be to briefly outline the major behavioral interventions, in order to understand what aspect(s) of the behavior is identified and/or targeted during treatment (e.g., pre-, during-, or post-exposure cognitions, feeling, behaviors); as well as the reported efficacy of the various approaches.

Electric-Shock Aversive Therapy. Studies falling within this treatment modality have included paradigms of punishment (Kushner & Sandler, 1966); classical conditioning (Fookes, 1969; Miller & Haney, 1976); escape (Mathis, 1975); or some combination of the above (Evans, 1980; MacCulloch, Williams & Britles, 1971).

Evans' aversive procedure will be discussed as representative of one of the best documented aversive studies conducted with exposers. Evans (1980) treated 21 male exhibitionists with an anticipatory avoidance technique. Participants viewed deviant, neutral and heterosexual phrases designed to elicit sexual imagery. Examples of "exposing" phrases were as follows: (1) Feeling the urge to expose; (2) Sitting in your car and exposing; (3) Feeling sexually excited after you've exposed. Phrases were projected on a screen in random order. Shock followed each deviant phrase by three to six seconds unless the subject advanced to the next phrase. Participants were interviewed at six months and one year following the conclusion of their initial block of weekly trials.

Follow-up results at six months indicated 19 of the 21 participants were symptom-free (self-report). Seventeen of these 19 reported that they were symptom free one year following the conclusion of the weekly aversion trials.

Although these results look promising, Evans (1980) stressed that there is "neither evidence to suggest that electrical aversion therapy is better than no treatment, nor any substantial evidence to suggest how it compares with other modes of treatment" (p.98). Evans' own treatment efforts were admittedly confounded by court-inspired motivation and other treatments in which the participants were simultaneously engaged. This confounding was very significant given that the outcomes were comparable to those reported from individual and group therapy approaches with other exhibitionist groups (Mohr et al., 1964). Moreover, Heath (1978) argued that a court appearance often provides a "policing effect" that enables individuals to suppress exposure, for anywhere from four to eighteen months depending on the individual's personality and his reaction to being convicted. If the latter is combined with the seemingly cyclic patterns of exposing reported by many exhibitionists before treatment, then Evans' own conclusions seem particularly appropriate (e.g., cases the present author is familiar with describe frequent episodes of exhibiting separated by intervals ranging from six months to five years).

Shame Therapies. A number of shame therapies have been reported (Jones & Frei, 1977; Serber, 1970; Stevenson & Jones, 1972; Wickramasekera, 1980). Wickramasekera's in vivo aversive behavior rehearsal (I-V-ABR) procedure will be discussed as representative of shame interventions. I-V-ABR consisted of three basic components: (1) Exposure deliberately prescribed by therapist and patient several weeks in advance and scheduled for a specific time and place. (2) The exposure enacted under the direction of the therapist in front of five female and two male mental health professionals (it was often hinted that the probation officer or lawyer may be observing from behind a one-way mirror). (3) During its enactment, the behavior was subjected by the patient, therapist and viewers to cognitive-verbal exploration of associated affect, bodily sensations and fantasy. The goal was to elicit and demythologize any fantasies that may cognitively mediate exposure in the natural environment. Wickramasekera described the procedure as "reducing the probability of hypnotic behavior under specific internal and external conditions which may operate as discriminative stimuli for hypnotic behavior" (1980, p.125). Here, hypnotic behavior was used to refer to activity executed under internal conditions of increased fantasy involvement (Sarbin & Coe, 1972).

The therapy team worked with postulated cognitive mediations by asking the client, during or between directed exposures, to focus on different parts of his body, or the parts of the female viewers, and to respond to very pointed questions and instructions: e.g., What is your mood when you expose yourself? What triggers the mood? Describe what you think we see as we look at you right now. How does your penis feel? Give your penis a voice, let it talk to us. Tell us what you are like in public and private life. What are your masturbatory fantasies? Following this stage, the client was asked to robe and disrobe many times as he explored aloud the relationship between his current feelings and his moods prior to and during exposure, as well as relationships to antecedents, consequences, and immediate situational factors. Wickramaskera reported that the patient was frequently in tears, trembling, weak and nauseous. The primary therapist dismissed the team, supported the client, commended him for his demonstrated courage, and left him wondering whether another procedure would be required. A second or more sessions were indicated if the client showed marginal arousal and "unauthorized" psychological escape behavior while physically present.

Wickramasekera (1980) reported that a relapse had not been reported for 18 of 19 men who participated in the I-V-ABR procedure at follow-up checks ranging from two to nine years. Side effects included mild to moderate anxiety, tension, depression of one to five weeks duration, repeated nightmares, secondary impotence of brief duration (2 to 4 weeks), and temporary loss of interest in sex. Some of the preceding symptoms were experienced by all participants. All symptoms were reported to have cleared up two months after treatment.

The I-V-ABR procedures appeared to effect rather impressive results. However, there were a number of confounding variables which Wickramasekera did not address. Primarily these dealt with the natural and imposed subject-selection factor. Due to the nature of the treatment, only highly motivated men who were desperate for help with their problem would likely have consented to the I-V-ABR procedure. The therapist further selected clients with a number of criteria which indicate I-V-ABR or contraindicate the procedure. Some criteria for this procedure were (1) men who have offended more than twice, and reported a high frequency of compulsive urges to expose; (2) men voluntarily seeking ABR treatment after they have been offered more conventional approaches; (3) men who were introverted or neurotic as defined by the Eysenck Personality Inventory (1968), or who have high trait anxiety on the MMPI; and (4) men who were very moral, inhibited, and "good" citizens in 90 percent of their public lives (Wickramasekera, 1980, p.126). Referrals would be discounted if they were prepsychotic or psychotic, medically not able to endure severe stress, sociopathic, or if they showed impenetrable cognitive defenses which prevented them from accessing deviant fantasy in a clinical setting. Wickramasekera (1980) attributed the cause of "impenetrable cognitive defenses" to "large and ineffective doses of psychotherapy" (p.127).

Thus, even though I-V-ABR was reserved for "chronic" exposers, the natural and imposed selection factors rendered what would appear to be ideal candidates for any treatment approach. The latter contention is supported by Forgac and Michaels (1982), who found that exhibitionists were not differentiated on frequency and chronicity of exposing, but rather on degree of criminality or sociopathic tendencies.

Given the traumatic nature of treatment, possible confounding variables, and the lack of a controlled comparison with other treatments, it would appear unethical to recommend the I-V-ABR procedure at this time. It seems very critical to evaluate other problems, e.g., self-concept, which may be related to exhibitionism following the ABR procedure. That is, the procedure may suppress any desires to expose, while ignoring underlying problems and/or creating new problems.

Covert and Assisted Covert Sensitization. Covert sensitization (CS) typically involves training the client in progressive muscular relaxation to enhance concentration and visualization of scenes, and then presenting scenes previously gleaned from the client, pairing images of the maladaptive behavior with unpleasant consequences (e.g., nauseating images; scenes of pain, danger, or damage) (e.g., Alford, Webster & Sanders, 1980; Brownell & Barlow, 1976; Brownell, Hayes & Barlow, 1977; Hughes, 1977). Assisted covert sensitization (ACS) is a term coined by Maletzky (1980), to describe a modification of the covert sensitization procedure, in which the aversive scenes are bolstered with an actual noxious stimulus (e.g., valeric acid, rotting flesh). Maletzky developed this approach because many of the exposers he treated with CS complained that the aversive images were too weak, "not bad enough." A comparison of CS, ACS, I-V-ABR, and electrical aversion treatment, showed that ACS, ABR and electrical aversion interventions were all comparable, and all superior to covert sensitization (Maletzky, 1980). It should be noted however, that this study has been criticized because not enough details were published to determine the methodological adequacy of Maletzky's work (Blair & Lanyon, 1980).

The most extensive work in this area has been carried out by Maletzky (1980). Maletzky documented a long term clinical research program involving a total of 155 subjects over a nine-year period. All subjects were treated with ACS, 62 of them in combination with other procedures. Systematic follow-up data were reported for up to 12 months for some subjects, and others were followed for up to nine years. Maletzky reported that 87 percent improved to the extent of eliminating all overt exhibitionistic behaviors. Although it is not possible to ascertain precisely what the active treatment components were, it is clear that Maletzky's work achieved a stable success rate over a significant length of time. An exemplary and detailed case study involving ASC is presented by Daitzman and Cox (1980). Their report demonstrated the importance of addressing the client's reaction to changes associated with therapy, enhancing appropriate sexual experiences, involving the client's spouse, and the possibility of training the client to conduct his own follow-up booster sessions.

Comment on Treatment Approaches

There has been a lack of controlled studies comparing various behavioral and nonbehavioral treatments. The positive effects of individual, group and behavioral interventions reported in the literature (Blair & Lanyon, 1981; Cox & Daitzman, 1980), seem incongruent with the reported recidivism rates (17 to 25 percent) (Tollison & Adams, 1979). The high recidivism rates may be explained by the fact that relatively few exhibitionists are actually involved in treatment of any kind, and/or that many treatment studies based success rates on relatively short follow-up periods.

The psychotherapy approaches have largely focused on identifying and changing the rationalizations that permitted the men to continue exposing (e.g., denial, beliefs that they are hypersexual, beliefs that the victims enjoyed the sight of their penises), identifying precipitating events and the mediations of those events (e.g., negative exchange with wife), and finding alternate ways of coping with those events (Hackett, 1971; Mathis, 1980). Behavioral approaches can be viewed as identifying and altering the cognitions and physiological arousal associated with exposing. Evans' anticipatory avoidance procedure focused on suggestive cognitive statements related to exposing (e.g., Sitting in your car and exposing), but did not appear to directly work with the irrational or inappropriate mediations which provide the focus in aversive behavioral rehearsal (ABR) and assisted covert sensitization (ACS) (e.g., She is surprised and happy at how big and hard your penis is—Maletzky, 1980). Behavioral therapists have also noted links between exposing and preceding events associated with stress (Daitzman & Cox, 1980) and moods of self-pity, boredom, anger and failure (Wickramasekera, 1980). Thus, at some level, both psychotherapy and behavioral approaches have targeted the cognitions mediating exposure. Shame therapies that involve in vivo exposing, and to a lesser extent assisted covert sensitization, also targeted the actual exposure behavior. One difference between psychotherapy and behavioral approaches seemed to be that of emphasis: that is, psychotherapy focused more on the cognitive mediations of precipitating events (e.g., conflict with boss), whereas, learning techniques emphasized the mediations further along the behavioral chain culminating in exposure (e.g., reactions to females on the street while driving home in the car).

The irrational quality of the ideation which mediates exposure emerges as a consistent trend in the literature on treatment. Two areas require further attention: One relates to the mediations of the moods reported to accompany precipitating events (e.g., stress, self-pity, anger). That is, are the former responses appropriate and reality oriented, or are these moods the result of irrational mediations that are different in content but similar in structure to those observed further along the behavioral chain (e.g., "I'm a total failure and a known idiot now"). The second issue relates to the etiology of the irrational cognitions. To date, the mechanism(s) underlying the mediations associated with exhibiting do not appear to have been specifically addressed. The growing emphasis on a potential neuro-anatomical circuitry or neurophysiological base to paraphilias (Jones & Frei, 1977; McConaghy, 1982; Myers & Berah, 1983) suggests a fertile area for investigation with the former notion in mind. Flor-Henry (1980) proposed a cerebral model of sexual deviations based on his work and the literature pertaining to the relation between cerebral organization, psychopathology and gender, and the studies on sexual functioning and temporal lobe epilepsy. Before discussing his model and formulating the present study, the literature providing the premises for a cerebral model of sexual deviation will be reviewed.

Literature Review on Cerebral Organization and Sexual Deviation

Psychopathology and Cerebral Organization

From the late sixties to the present, there has been an accumulating literature relating cerebral organization to schizophrenia and affective disorders (Dimond, 1980; Flor-Henry, 1978; Galen, 1974; Gruzelier & Flor-Henry, 1979). A thorough review of this literature is peripheral to the main thesis of this paper, but relevant aspects will be summarized in a subsequent section on sex differences, psychopathology and the brain. The purpose of this brief section is merely to acknowledge what might be described as a relatively new model of psychopathology, that is, a cerebral model of psychopathology. The significance in terms of this discussion is that the established link between psychopathology, gender, and cerebral organization in terms of schizophrenia and affective disorders, provides the initial rationale for exploring cerebral organization in the psychiatric disorder of exhibitionism.

Sex Differences, Psychopathology, Hemispheric Specialization and Cortical Organization

Exhibitionism and many other paraphilias (e.g., pedophilia, transvestism, fetishism, frotteurism, scatologica, voyeurism) occur almost exclusively in males (McConaghy, 1982; Tollison & Adams, 1979). Therefore, a cerebral approach to understanding paraphilias, should consider sex differences in the brain.

Ablative experiments with mammals have suggested a differential cortical function in males and females (Ford & Beach, 1951). That is, cortex removal in females did not prevent fertile copulation; whereas, males (rats, cats, and dogs) deprived of the cortex immediately became sexually inactive and showed little, if any, interest in the receptive female. Ford and Beach interpreted these findings to mean that the cerebral cortex contributes more heavily to the sexual response of the male than to that of the female. An alternative explanation may be that sexual drive or desire to initiate sexual behavior is decreased or destroyed by cortical removal in both sexes, but is more noticeable in males because they typically assume the initiating and more aggressive role. Beach and Ford also noted a greater capacity for sexual learning and conditioning in male mammals relative to females: stimuli of no original sexual significance became capable of evoking intense erotic arousal following conditioning in males.

Dimond (1980) postulated that the cortex is essential for sexual behavior even in human males, because the male cortex incorporates antecedent and associated behavior for sex. Unlike the females of most species, the male from primitive times has initiated and assumed a whole cycle of behavior which ultimately leads to finding and pairing with a mate for reproduction (Buffery & Gray, 1972).

In light of these assumptions, Dimond suggested that sexual learning (i.e., learning reinforced and entrenched by opportunities for sexual contact) would appear to be very important in evolutionary terms, and would likely occupy some significant part of the cortex in males. He further postulated the presence of a discrete sexual learning system, as separate from other types of learning systems. This tentative model of male sexuality would account for the vulnerability of the male system for sexual learning to fix itself in a pathological manner upon some unusual object or act, and for the high incidence of paraphilias in males relative to females.

The degree and nature of hemispheric assymmetry appeared to be another major difference between the sexes. McGlone (1976a, b; 1977) studied the effects of unilateral brain damage as a function of sex and the hemisphere damaged (i.e., left vs. right). Adult males showed a pattern of verbal intellectual decline following left-hemisphere lesions and depressed non-verbal intelligence following right-hemisphere lesions. In contrast, women did not show selective verbal or performance deficits after unilateral brain injury.

McGlone's findings indicated that, relative to females, males have greater hemispheric specialization. Laterality of functioning within males was also found by Lansdell (1962). His examination of the effects of temporal lobe surgery indicated that some of the physiological mechanisms underlying artistic judgment and verbal ability may overlap between hemispheres in the female brain, but are in opposite hemispheres in the male.

Apart from the degree of laterality in brain functions, there was substantial evidence to suggest a functional vulnerability of the dominant (left) hemisphere in males and the nondominant (right) hemisphere in females (Dimond, 1980; McGlone, 1977; Wexler, 1980). In simplistic terms, males demonstrated greater spatial abilities compared to females, and females showed superior verbal abilities. The male's superior ability in spatial functions is interesting and in keeping with the sex-related systems (searching systems and bodily guidance systems to the female target) postulated by Dimond (1980) to differentially characterize the male cortex.

The vulnerability of dominant and nondominant hemispheres in males and females respectively, has been supported by the distribution of disorders linked to left or right hemisphere dysfunctions in men and women (Flor-Henry, 1978). Flor-Henry and others have presented evidence suggesting there are a number of disorders over-represented in males (e.g., infant autism, psychopathy, schizophrenia), and that some of these disorders (e.g., psychopathy and schizophrenia) have been associated with abnormal activation of the left hemisphere. These findings suggested an excess of dominant hemisphere dysfunctions within the sex that may indeed have a functional vulnerability of that hemisphere. Flor-Henry has presented similar evidence indicating that women are significantly more susceptible than are men to affective disturbances, and that affective disturbances are associated with dysfunction of the nondominant hemisphere—the vulnerable hemisphere in women.

Given the above findings, a cerebral approach to sexual deviations in males seems a logical one. Evidence has suggested a higher vulnerability of the male cortical area to disturbances of learning related to sexual functions, and a particular vulnerability of dominant or left hemisphere functions.

Sexual Behavior and the Brain

An advanced cerebral model of sexual functioning is far from complete, but crucial information is available about regions and systems which are involved in human sexual activity. For example, the male orgasmic state has been linked largely to systems of the nondominant hemisphere (Cohen, Rosen & Goldstein, 1976; Karacan, Goodenough, Shapiro & Starker, 1966), while the control or regulation of that state is postulated to be determined by left hemisphere representations of external stimuli and/or subjective experiences (Flor-Henry, 1980). A comprehensive review by Dimond (1980) identified the spinal and limbic systems and a cortical component coming largely from the temporal lobes, as incorporating the primary mechanisms for the control and production of sexual behavior.

Spinal Cord. The role of the spinal system in human sexuality has largely been learned from cases of complete transection of the spinal cord due to injury or disease (Dimond, 1980; Money & Ehrhardt, 1972; Silver, 1975). These cases indicated (1) that the lower cord is responsible for the reflex control of the genital system as demonstrated by reflex erections and ejaculations in paraplegiacs and quadriplegiacs; and (2) that this reflex component of the sexual system can exist independent of limbic and cortical components. The nature of the relationship between the spinal and limbic centers within intact systems was not clear.

Limbic System. This organization has been referred to by Deutsch and Deutsch (1973) as a group of structures concerned with the development and elaboration of various emotions. These structures usually include the cingulate, hippocampal gyri, hippocampus orbitoinsula, temporal polar region, amygdala, septum, hypothalamus, epithalamus, and dorsomedial and anterior thalamic nuclei (Dimond, 1980). That the limbic system is related to sexual activity was evidenced from the abnormality of sexual function that accompanied dysfunction within the limbic structures. Examples included the disinhibition of aggressive and sexual impulses in rabies (Gastaut & Collomb, 1954, as cited in Dimond, 1980); the gross hypersexuality following lethargic encephalitis (Poeck & Pilleri, 1965); the loss of potency following septofornico hypothalamic lesions (Bauer, 1959); and the hypersexuality reported to develop with deep frontotemporal tumours in man (Lechner, 1966, as cited in Dimond, 1980). Dimond (1980) postulated that the three limbic structures crucial for sex are the septum (i.e., orgastic center), the amygdala (i.e., sexual inhibitory system), and the hypothalamus (i.e., activates and controls sexual behavior, including orgastic center).

Temporal lobe. There is substantial evidence that the temporal lobes comprise the cortical component in sexual behavior (Dimond, 1980). Kluver and Bucy (1939) demonstrated that the bilateral removal of the temporal lobes in monkeys resulted in excessive orality, psychic agnosia and hypersexuality. Sexual abnormalities in humans have also been linked to temporal dysfunction, typically manifested as temporal lobe epilepsy (Flor-Henry, 1980).

One of the first group studies relating sexuality to temporal structures assessed personality changes in patients with temporal lobe epilepsy who underwent temporal lobectomies (Hill, Pond, Mitchell & Falconer, 1957). Rating scales were completed for 15 patients pre- and post-operatively on the basis of interviews with the patients and their significant others. Results showed a number of marked changes, including increased sexual drive and potency in 14 of the 15 patients. The increased libido involved the development of perverse behavior in one case (i.e., public masturbating and exhibiting), and substitution of normal libidinal interest and activity for perverse sexual tendencies in three cases (Note: two of these three cases are detailed elsewhere in the literature and will be discussed in a later section).

Subsequent studies in this area suggested that the increased libido reported by Hill et al. (1957) reflected a pre-operative state of, or tendency towards, hyposexuality (Bancaud, Fawel, Bonis, Bordes-Ferrer, Miravet, & Talairach, 1971; Blumer & Walker, 1967; Taylor, 1969). Blumer and Walker (1967) found that 11 of 21 patients with temporal lobe epilepsy of considerable duration and severity were hyposexual. The authors defined hyposexuality in the global sense: absence or marked decrease of cognitive libidinous desire and imagery, genito-pelvic arousal and response. Post-operative results revealed a negative correlation between presence of seizure activity and hyposexuality. Transient or permanent post-operative increase in sexual response occurred in seven of eleven patients, invariably coinciding with the improvement of the seizure condition. However, improved seizure condition did not necessarily result in increased libido. Increased sexuality was not related to the laterality of the lesions. The authors inferred from the above findings, that sexual changes are probably related to the effect on the activity of the medial temporal structures produced by the presence or absence of intrinsic seizure discharges.

Taylor (1969) also monitored the sexual adjustment of patients (N=100) submitted to temporal lobectomy for epilepsy. Again, the most common abnormality pre-operatively was low sexual drive. Perverse sexuality was also evidenced (15 cases). Heterosexual hypersexuality was rare. Following temporal lobectomies, 22 patients' sexual adjustment improved and 14 worsened. The direction of the change was viewed as a function of age (e.g., age of onset, age at time of operation) by the authors.

The above studies suggested that the temporal lobes play an important role in the regulation of sexual behavior. Seizure discharge in the temporal regions appeared to be correlated with hyposexuality (Blumer & Walker, 1967; Hill et al., 1957; Taylor, 1969); however, sexual perversions have been evidenced (Dimond, 1980), and in rare instances hypersexuality has been reported (Terzian & Dalle Ore, 1955). Thus, the exact nature of the relationship between the temporal lobes and sexuality has not been made clear. Psychological and socio-cultural aspects of sexuality have been judged to be of considerable importance (Bancaud et al., 1971; Taylor, 1969).

Temporal Lobe Epilepsy and Paraphilias

A relationship between the temporal regions and sexual deviations was clearly suggested in case studies of individuals with temporal lobe epilepsy and fetishism and/or transvestism (Flor-Henry, 1980; Dimond, 1980). In three cases briefly outlined below, epileptic seizures and paraphiliac behaviors were alleviated following temporal lobectomies (Hunter, Logue & McMenemy, 1963; Mitchell, Falconer & Hill, 1954; Pond & Bidwell, 1954).

Pond and Bidwell (1954) described a boy, age 13, who suffered from major seizures from about age 3, and presented as a "liar, bad-tempered and sexually perverse." Unfortunately, the nature of his perversion was not specified. Electroencephalograph recordings showed frequent firing of left inferior temporal focus. Following a temporal lobectomy, the boy's behavior improved dramatically and he was able to attend regular schools and reside at home with his grandmother for the first time. The authors imply that the troublesome temper, lying and perverted sexual behavior ceased.

A similar but more detailed case involving a male patient, age 38, was reported by Mitchell et al. (1954). The patient reported a fetish behavior which involved sneaking into the bathroom and looking at a safety-pin. This behavior resulted in an extremely pleasurable experience which the patient called "thought satisfaction." His experiences with "thought satisfaction" dated back to early childhood, and by age 8, were followed by an epileptic absence. The total sequence was first observed by the patient's wife when he was 23: staring at the safety-pin for one minute, appearing glassy-eyed, humming for a few further seconds, making sucking movements with his lips, and then standing immobile for about two additional minutes. By age 31, the patient's immobility stage was followed by backward marching and right hand movements, and occasional cross-dressing in his wife's clothing. Throughout the five years prior to the patient's scheduled lobectomy, he became increasingly impotent, and claimed that the safety-pin replaced his need for a genital-outlet. During the last year before his surgery, the patient had three psychotic episodes marked by grandiosity, paranoia and religiosity; two of which followed fits. After a left anterior temporal lobectomy, both the epilepsy and fetishism disappeared and he resumed a sexual relationship with his wife. The authors described the patient as demonstrating more mature attitudes towards his work and his sexuality. His intellectual abilities remained constant, except for some decrease in his ability to learn and retain new verbal material.

Hunter et al. (1963) reported a related case of a man, age 39, who exhibited transvestite and fetishist behavior from age 9 on, and developed temporal lobe epilepsy at age 29. This case differed from that described by Mitchell et al. (1954) in that the patient's epileptic attacks were not precipitated by his fetishist behavior. However, a left anterior temporal lobectomy alleviated both conditions, again suggesting a neurophysiological relationship between the paraphilias and the epilepsy.

Davies and Morgenstern (1960) published a case study of a bright man, who showed an isolated spike in the right temporal region, and in whom the desire to cross-dress was preceded by temporal lobe aura (i.e., epigastric and jaw sensations). No abnormalities were evidenced in the patient's early sexual development, and his first urge to transvest followed his first epileptic symptoms by eight years. Temporal lobectomy was not performed and both conditions persisted at the time the authors published the article.

That a relationship between temporal lobe dysfunction and the paraphilias of transvestism and fetishism seemed to exist regardless of which condition manifested first, was further apparent in the findings of Epstein (1961). Epstein presented five cases of fetishism, four of which were complicated by transvestism. Only two of these patients had clinical epilepsy, yet electroencephalographic recordings indicated focal temporal abnormality in four cases, and suggested it in the fifth. From these findings, Epstein postulated a relationship between transvestism/fetishism and brain dysfunction, and further suggested that the dysfunction involved temporal lobe mechanisms which may, particularly in males, normally subserve sexual arousal patterns.

The case studies reviewed above suggest a relationship between temporal lobe dysfunction and sexual deviation. In particular, the case presented by Mitchell et al. (1954) suggests that temporal lobe lesions play a causative role in the development of sexual deviations. Kolarsky, Freund, Machek and Polak (1967) investigated the seeming relationship between neuropathology and paraphilias with 86 male participants from the central epileptic clinic in Prague. The authors hypothesized that in a sample of patients with various brain lesions, the sexual deviations would predominantly be associated with temporal lobe lesions lasting since early infancy (i.e., before age 3). Neurological (EEGs) and psychosexual (interviews) data were compiled by experts in the respective fields who were blind to the purpose of the study.

The results indicated that sexual deviations, diagnosed independently of the neurological data, were significantly correlated with temporal damage occurring before age one. Sexual disturbances (e.g., hyposexuality) were associated significantly more with temporal than with extratemporal lesions. The onset of epilepsy was markedly earlier in temporal lesion patients with sexual deviations than in those without perversions. The sexual deviations encountered included voyeurism, exhibitionism, pedophilia, sadism, masochism, fetishism, transvestism and homosexuality.

Transvestism and fetishism have been predominantly identified in studies relating temporal lobe epilepsy and paraphilias. However, Hooshmand (1969) described two cases of temporal lobe seizures and exhibitionism which are particularly relevant to the present work. In both cases, the individuals were involved in legal suits for "exhibitionism." Electroencephalograph recordings showed a left temporal spike focus in one case, while a right temporal glioblastoma was discovered in the second case. Chemotherapy (not specified) enabled the patient showing EEG abnormality to control his exhibiting behavior for one year. Partial removal of the temporal tumour and radiotherapy coincided with the termination of the second patient's exposure activities. The author differentiated the automatisms simulating exhibitionism (i.e., ictal indecent exposure) in the latter two cases from true exhibitionism, and suggested that EEG may be very helpful in achieving more accurate diagnoses. Unfortunately, the points of differentiation were not presented.

Hooshmand's hypothesis of "true exhibitionism" vs. "ictal indecent exposure" may be valid, and it is interesting given that most studies have examined sexual deviations within identified samples of brain dysfunction (typically temporal lobe epilepsy). It seems that the obvious next step would be to examine neurological data within an identified sample of exhibitionists to determine if they show signs of temporal lobe dysfunction. That is, is there a neuropathological characteristic of exhibitionism in general, or does brain dysfunction only characterize a small sample of exhibitionism cases which are etiologically different from general exhibitionism?

Temporal Lobe Functions

The implication of the temporal region in regulating sexuality, and in association with perversions, warrants an examination of the general functions of this center. In contrast to the executive and regulatory functions of the frontal lobes, the temporal lobes have been related to subjective consciousness, playing an integrative role between information from the external world and the individual. Injury to the left temporal lobe has been evidenced as impairment in comprehension of the written or spoken word, writing, verbal memory, and in logical, analytical and sequential thinking. Damage lateralized to the right temporal lobe has been associated with disturbances in processing and recalling visual, spatial, and kinesthetic information, and musical qualities such as tone and melody (Lezak, 1976; Williams, 1969).

Williams (1969) suggested that the most significant role of the temporal lobes is "the function of integration--integration of sensations, of emotions, and consequent behavior" (p.700). Relative to the functions of other regions of the brain, the functions served by the temporal lobe were postulated to be

> much more closely identified with the subject himself; they involve his emotional life, his instinctive feelings and activities, and his visceral responses to environmental change. This environment includes the actual physical change around his body as well as the effects of his own feelings and drive--that is to say, they include his social as well as his physical milieu" (Williams, 1969, p.701).

Cerebral Model of Sexual Deviation

Five major premises can be postulated from the literature reviewed on cerebral organization and functions, psychopathology, sexual behavior, and temporal lobe epilepsy. The first is that normal sexuality is determined by the presence of normal verbal-ideational sexual representations which are contingent largely on intact dominant hemispheric systems, and on their normal ability to trigger the orgasmic response in the nondominant hemisphere (Cohen, Rosen & Goldstein, 1976; Flor-Henry, 1980). The second is that gender, psychopathology and cerebral organization are linked (Flor-Henry, 1978). More specifically, the left hemisphere is vulnerable in males (McGlone, 1977; Wexler, 1980), and has been frequently associated with psychopathologies (e.g., infant autism, schizophrenia) predominantly found in men (Flor-Henry, 1978). The next premise is that, relative to females, the male cortical area is more vulnerable to disturbances of learning related to sexual functions (Buffery & Gray, 1972; Dimond, 1980; Ford & Beach, 1951). The fourth is that sexual behavior is regulated primarily by mechanisms of the limbic and spinal systems, and most importantly, that the temporal region plays a mediating role between the environment and the rest of the brain areas related to sexual functioning (Dimond, 1980). The final premise is that temporal lobe dysfunction is related to sexual deviations (Epstein, 1961; Hooshmand, 1969; Kolarsky et al., 1967; Mitchell et al., 1954).

Based on the preceding premises, Flor-Henry (1980) proposed a tentative and heuristic model of sexual deviations. A paraphrase of his model follows: Dysfunction of the left, temporal region provides the substrate for inappropriate mediations of environmental events, which in turn lead to or become associated with perturbed interhemispheric interactions, so that only these distorted mediations are capable of eliciting, or have a high probability of inducing, the orgasmic response. The postulated ease with which atypical stimuli are conditioned to be sexually arousing in males, plus early sexual experience may explain the exact nature of the deviant sexual expression.

CHAPTER III

RATIONALE AND HYPOTHESES

Rationale

The rationale for investigating the proposed, general model of sexual deviation in the particular case of male genital exhibitionism can be generally stated as follows: (1) the inadequacy of or lack of support for existing etiological models; and (2) the theoretical capacity of the proposed model to account for seemingly important factors indicated in the literature on exhibitionism.

The lack of sufficient backing for traditional theories of exhibitionism, psychodynamic and learning theories, has been repeatedly attested in the literature (e.g., Blair & Lanyon, 1981; Heath, 1978; Myers & Berah, 1983; Rooth, 1971). This stance is largely supported by the numerous discrepancies in reported descriptors, and the failure of classification systems reconciling some of these differences to enhance understanding within the context of existing causal frameworks. The latter evaluation neither minimizes, nor is contradicted by, the success of particular therapeutic modalities at an applied level. That is to say, different treatment interventions may achieve varied degrees of success for any number of reasons without etiological understanding as a necessary prerequisite condition. An illustrative medical analogy is the possible alleviation of symptoms with a chemotherapy model independent of, or without, a diagnosis of the entity/condition causing the symptoms.

The proposed cerebral model must theoretically account for the following major and consistent trends in the literature on exhibitionism: (1) exposed penis; (2) evidenced exclusively or almost exclusively in males (e.g., Gayford, 1981; McConaghy, 1982); (3) marked discrepancies in reported personality and social descriptors (e.g., Blair & Lanyon, 1981; Langevin et al., 1979); (4) irrational cognitions and observed success of varied therapy interventions addressing cognitions (e.g., Mathis, 1980; Daitzman & Cox, 1980; Wickramasekera, 1980).

That the majority of exhibitionists expose their penis would be explained by the proposed model as follows: the exposure scenario is associated with disturbed mediational processes which have a high probability of eliciting an orgasmic response. The theory does not, at this point, detail how the orgasmic trigger becomes linked to exposure as opposed to peeping, obscene phone calls or other deviant behavior. However, one possibility is that the neural disturbance predisposes the individual to a specific deviant mediation and behavior. Another is that the proposed substrate for dysfunctional mediational processes provides the predisposition, while individual learning experiences determine the specific form of the deviant expression.

Though the model thus theoretically accounts for exhibiting behavior, it must, to be compatible with the literature on exhibitionism, not preclude sexual orgasm in nonexposing experiences (e.g., with wife). Several exhibitionists in treatment with the present author revealed that they usually fantasized of exposing while making love with their regular sexual partner. Moreover, it was frequently reported by the men that "no rush could compare" to exposing. Such clinical observations suggest that, for exhibitionists, the orgasmic response experienced from exposing may be qualitatively and/or quantitatively different from that obtained through nondeviant sexual activites.

Second, the model would predict sexual deviations predominantly in males. That is, the model is based on premises suggesting that the male cortical area is more vulnerable to disturbances of learning related to sexual functions (e.g., Dimond, 1980), that cerebral organization is related to gender (e.g., McGlone, 1977), and that psychopathology (e.g., infantile autism, schizophrenia) is related to cerebral organization and gender (Flor-Henry, 1978).

Whereas the premises of the proposed model suggest a correlation with gender, temporal and interhemispheric dysfunction would not imply predictions of systematic findings for variables such as socio-economic status, familial-environmental factors, alcohol or other drug usage, nor personality correlates such as passivity or femininity. Indirect support for the latter tenet is found in studies of various cerebral dysfunctions, e.g., epilepsy, which have not been found to be related to a definitive set of personality correlates or environmental factors (Taylor, 1969; Kolarsky et al., 1967). Moreover, evidence of classification systems based on degree of criminality or chronicity of exposure (Forgac & Michaels, 1982; McCreary, 1975) could be postulated to relate to the extent and the nature of the existing dysfunction. For instance, frontal lobe dysfunction, which has been associated with lack of forethought, poor anticipation sequencing abilities, and aggressiveness (Lezak, 1983), would be predicted to characterize the small percentage of exposers who also engage in violent sexual crimes. Thus, the model would predict a potential typology of exhibitionists based on the degree and nature of the cerebral dysfunction. At present, the theory's potential would appear to be predetermined by limitations in assessment and technological tools.

Fourth, the model's focus on temporal lobe and resultant or associated interhemispheric dysfunction would appear, at least theoretically, to provide a compelling explanation for the seemingly abnormal mediational processes characterizing exhibitionists. The success of some psychotherapy and behavioral therapies could be interpreted within this framework as follows: irrational mediations were brought into awareness, and/or were extinguished gradually or were used to prevent the realization of associated deviant behaviors. This raises interesting possibilities about whether alteration of cognitions could result in changes in the related neural structures.

The proposed model of sexual deviation was derived independently of the literature on exhibitionism. However, the above discussion indicates that the literature on exhibitionism does not contradict the basic premises of the theory, but rather the model provides an adequate explanatory framework within which to conceptualize existing knowledge on exhibitionism. Thus, despite the paradigm's lack of specificity regarding the genesis of individual deviations, it would appear to be worthy of investigation as it applies to exhibitionism. Finally, the recent movement towards a neural-based theory of exhibitionism by those working directly in the field (e.g., Myers & Berah, 1983), suggests that the present study provides a timely and logical step in exhibitionism research.

In addition to the rationale for the proposed theoretical model, there exists substantial evidence for the use of neuropsychological assessments to provide indices of cerebral dysfunction (Dodrill, 1978; Lezak, 1983; Matarazzo, Weins, Matarazzo & Goldstein, 1974; Reitan, 1955; Reitan & Davison, 1974). The proposed model of sexual deviation directly concerns left temporal lobe dysfunction, which has been found to manifest selective impairment in the learning and retention of verbal material (Meyer & Yates, 1955; Milner, 1974), regardless of whether the material is heard or read (Blakemore & Falconer, 1967; Milner, 1967) and regardless of whether a recall or recognition procedure is used (Milner & Teuber, 1968). Unlike the right temporal lobe, left temporal dysfunction has not been associated with the recall of visual and auditory patterns that do not lend themselves easily to verbal coding (Kimura, 1963; Milner, 1962, 1967, 1968; Warrington & James, 1967). Neuropsychological instruments shown to be sensitive to left temporal dysfunction include the Speech Sounds Perception Test (Reitan & Davison, 1974; Russell, Neuringer & Goldstein, 1970) and Williams Verbal Learning (Williams, 1968; 1978). Neuropsychological tests used to identify right temporal lobe dysfunction include the Seashore Rhythm Test (Lezak, 1983; Reitan & Davison, 1974), the Tactual Performance Test-Memory (Reitan, 1964; Teuber, 1964; Teuber & Weinstein, 1954) and the Rey-Davis Test (Williams, 1968).

Though useful in differentiating left/right dysfunctions, neuropsychology has limited capacity for measuring interhemispheric disturbances which were also predicted by the proposed cerebral model (Berlucchi, 1974; Sperry, 1974). However, a general indicator of interhemispheric functioning may be derived by comparing single hand performances (primarily activating the contralateral hemisphere) with both hand performances (activating transactional aspects of interhemispheric integration) on the Purdue Pegboard (Costa, Vaughan, Levita & Farbor, 1963; Vaughan & Costa, 1962) and the Tactual Performance Test (Reitan & Davison, 1974).

Power spectral analysis of electrical brain activity has provided insights into the differential neurophysiological characteristics of psychiatric and normative populations (see review by Flor-Henry, et al., 1983). The greatest advantage of electroencephalograph (EEG) relative to neuropsychological measures, is that interhemispheric functioning can be quantitatively examined through the analysis of right/left energy oscillations (Flor-Henry & Koles, 1981). In addition, left/right dyssynchrony can be evaluated by examining the relative intensity of hemispheric activation (power) and the variability of the intensity, phase and coherence at different frequencies during different mental states (Basar, 1980; Flor-Henry, Koles & Tucker, 1982; Nunez, 1981). Though the complexity of cerebral functioning and the current level of technology prevents the localization of the origin of manifested abnormalities (Flor-Henry, et al., 1983; Nunez, 1981), the use of matched controls enables the derivation of an "index of deviation" (significantly different statistically from normative EEGs) and behavioral descriptions of the observed differences.

Flor-Henry and Reddon (Flor-Henry, 1984) have developed a heuristic model of brain functioning consisting of 13 EEG measures. These measures were derived from a principle components analysis of EEG measures for normals, and provide information on anterior and posterior functioning, within and between hemispheres for homologous and nonhomologous regions. Within the present study, five of the 13 EEG measures were selected a priori because of their theoretical relation to the left hemisphere and/or the posterior brain. These EEG measures were anterior --> posterior left intrahemispheric phase, left --> right interhemispheric crossed phased, log right/left anterior power ratio, log right/left posterior power ratio, and posterior oscillations.

Individuals convicted of nonsexual misdemeanors would appear to provide the ideal comparison group for determining whether specific cerebral dysfunctions are related to sexual deviations as evidenced in exhibitionism. However, the only individuals in the latter category who were available for assessment were female shoplifters and men convicted of impaired driving charges; both of whom were ruled out because of the known effects of gender and alcoholism on cerebral functioning (Dimond, 1980; Goldstein & Shelly, 1980; Parsons, 1975; Ryan & Butters, 1980). Given the above, male normative groups were considered to be the most appropriate for comparison purposes. Such normative comparisons provide control for variables likely to confound measures of cerebral functioning. However, their use does not rule out the possibility that similar cerebral dysfunction also exists in males who are convicted of nonsexual offences, and examination of the latter will become an important avenue for future research efforts.

Hypotheses

Based on the preceding rationale, selected neuropsychological tests and power spectral EEGs were administered to exhibitionist and normative comparison groups to examine temporal and interhemispheric functioning. Hypotheses were as follows:

Hypothesis I

Exhibitionists will make significantly more errors than controls on neuropsychological tests tapping left, temporal lobe functions (i.e., Speech Sounds Perception, Williams Verbal Learning).

Hypothesis II

Controls will perform significantly better than exhibitionists on motor tasks requiring both hands (i.e., Purdue Pegboard--Both Hands, Tactual Performance Test--Both Hands).

Hypothesis III

Exhibitionists will perform significantly better on motor tasks requiring a single hand than they will on tasks requiring both hands (i.e., Tactual Performance--Preferred Hand and Tactual Performance--Nonpreferred Hand scores will be better than Tactual Performance--Both Hands score; Purdue Pegboard--Preferred Hand and Purdue Pegboard--Nonpreferred Hand scores will be better than Purdue Pegboard--Both Hands score).

The exploratory nature of EEG research led to an emphasis on general group differences. Task conditions were viewed primarily as an appropriate paradigm to reveal predicted differences between exhibitionists and controls. Research hypotheses were as follows:

Hypothesis IV

Exhibitionists will display deviant EEG characteristics which affect temporal lobe functions in the alpha frequency band on the following EEG measures: anterior --> posterior left intrahemispheric phase, left --> right interhemispheric phase, log right/left anterior power ratio, log right/left posterior power ratio.

Hypothesis V

Exhibitionists will demonstrate significantly fewer posterior energy oscillations than will controls in the alpha frequency band.

CHAPTER IV

METHOD

Subjects

Subjects were 23 males court-referred to a community forensic clinic[1] for treatment of apparent sexual deviations, who volunteered to participate in the assessment procedures for this study. Twenty-two of the 23 were diagnosed as having problems with exhibitionism, and one with exhibitionism and voyeurism. All subjects were living at home in the community, and all but one were participating in a weekly psychotherapy group for their sexual deviations as part of their probation order. The individual who was not on probation was attending group sessions for self-motivated reasons. Power spectral EEGs were not conducted on three participants (one moved out of the vicinity while two others had completed treatment and did not wish to return for research purposes).

Table 1 shows descriptive data regarding age, intellectual functioning, education, marital status, previous sexual and nonsexual offences, and alcohol/drug usage prior to exposing.

Details about the assessment procedures were presented to all subjects in a psychotherapy group session. Subjects were informed that individual feedback on the intellectual and neuropsychological assessments would be scheduled for anyone interested in his results,

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[1] Forensic Assessment and Community Services, Alberta Hospital Edmonton, Edmonton, Alberta.

Table 1

Descriptive Data for Exhibitionists (n=23)

	$\bar{X}$	(SD)
Age	27.04	(5.52)
IQ[a]	99.91	(10.06)
Education[b]	14.80	(1.97)
Marital Status	%	n
Single	30.43	7
Engaged	4.35	1
Living Together/Married	65.22	15
Separated/Divorced	8.70	2
Children/Wife Pregnant	43.48	10

Previous Offences	No Prior Arrests		1 - 5 Prior Arrests		6+ Prior Arrests	
	%	n	%	n	%	n
Nonsexual	73.91	17	26.09	6	0	
Sexual apart from exposure	86.96	20	8.70	2	4.35	1
Indecent exposure	47.83	11	52.17	1	0	

Use of Alcohol/Drugs Before Exposing	%	n
Never	39.13	9
Occassionally	39.13	9
Half the time	4.35	1
Frequently	17.39	4

[a] Full Scale WAIS-R. [b] Includes post-secondary education of all types.

and that group results for all assessments would be presented in a psychotherapy group session following the completion of the study. A copy of the subject consent form is shown in Appendix A.

Controls

Exhibitionists' performance on neuropsychological measures was compared to that of 91 male volunteers without a psychiatric or neurological history. These control subjects were selected, on the basis of age and sex, from a previously conducted normative study on the Halstead-Reitan (Fromm Auch & Yeudall, 1982). Table 2 shows the normative data for the present control group, as well as published norms for other nonpsychiatric control groups. (The latter norms are discussed in more detail in the section describing the neuropsychological tests.)

Descriptive variables (e.g., age, education, IQ) for the normative and exhibitionist groups are found in Table 3. Intellectual functioning was assessed by the WAIS for the normative group and the WAIS-R for the exhibitionist group. Wechsler (1981, p.47) reported that "the WAIS Verbal, Performance, and Full Scale IQs are about 7, 8, and 9 points higher, respectively, than the corresponding IQs on the WAIS-R." Thus, for comparison purposes, the IQ data for the normative group is also presented with Wechsler's adjustments. From the data presented in Table 3, the normative group is judged to be an appropriate control group for the present study group.

EEG characteristics for the exhibitionist group were compared to a second group of male volunteers without a psychiatric or neurological history. These control subjects were selected such that they were

Table 2

Published Normative Data for Tests in the Modified-Halstead Reitan Battery

Test	Fromm Auch & Yeudall (1982)		Matarazzo et al. (1974)		Weins & Matarazzo (1977)			
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Seashore Rhythm (errors)	90	2.56 (1.99)	29	2.8 (1.9)	24	2.5 (2.3)	24	2.9 (1.8)
Speech Sounds (errors)	90	3.98 (2.16)	29	3.8 (1.7)	24	4.2 (2.6)	24	3.9 (2.2)
Tactual Performance Test Time (mins)	88	10.24 (3.01)	29	9.4 (2.7)	24	9.7 (3.2)	24	9.2 (2.4)
Memory (# correct)		8.42 (1.07)		8.4 (.8)		8.5 (.9)		8.7 (.8)
Williams' Verbal Learning (errors)	89	3.88 (3.36)						
Age	90	26.06 (5.58)	29	24.0 (?)	24	23.6 (?)	24	24.8 (?)
Education	90	15.89 (2.77)	29	14.0 (?)	24	13.7 (?)	24	14.0 (?)
% Males	100		100		100		100	

continued on next page

Table 2, continued

Published Normative Data for Tests in the Modified-Halstead Reitan Battery

Test	Fromm Auch & Yeudall (1982) N	Fromm Auch & Yeudall (1982) Mean (SD)	Williams (1968) N	Williams (1968) Mean (SD)	Purdue Research Foundation (1948) N	Purdue Research Foundation (1948) Mean (SD)
Williams' Non-Verbal Learning (errors)						
Initial Presentation	89	1.48 (2.09)	50	6.9 (5.12)		
Rotated 90°		1.36 (2.67)	50	3.4 (3.06)		
Purdue Pegboard Test (frequency)	88					
preferred		15.63 (1.78)			434	17.19 (?)
nonpreferred		15.25 (1.94)				16.07 (?)
both		12.84 (1.43)				13.68 (?)
Age	90	26.06 (5.58)	50	?(range 17 to 45)	434	?
Education	90	15.89 (2.77)	50	nursing staff college graduates		college students
% Males	100			?		?

Table 3

Descriptive Variables for Neuropsychological Controls and Exhibitionists

	Controls (n=91)				Exhibitionists (n=23)		
	$\bar{X}$ (SD)				$\bar{X}$ (SD)		
Age	26.06 (5.58)				27.04 (5.52)		
Education	15.89 (2.77)				14.80 (1.97)		
Intelligence	WAIS	SD	(WAIS-R)[a]	(RANGE)[b]	WAIS-R	SD	RANGE
VIQ[c]	122.13	9.30	(114.13)	(90–133)	99.91	12.48	82-128
PIQ[d]	115.75	9.57	(108.75)	(82-131)	100.36	10.40	81-123
FSIQ[e]	120.55	8.52	(112.55)	(90–129)	99.82	10.06	84-131

[a, b] Based on Conversion Adjustment given by Wechsler (1981, p.47).

[c] Verbal Intelligence Quotient. [d] Performance Intelligence Quotient.

[e] Full Scale Intelligence Quotient.

Table 4

Descriptive Variables for EEG Controls and Exhibitionists

	Controls (n=19)		Exhibitionists (n=19)	
	$\bar{X}$ (SD)		$\bar{X}$ (SD)	
Age	26.88 (4.88)		26.58 (5.2)	
	n	(%)	n	(%)
Dextrals	15	(78.9)	15	(78.9)
Sinistrals	4	(21.1)	4	(21.1)

matched with the exhibitionists on age and handedness variables (see Table 4).

Procedure

Exhibitionists completed the following assessments in the order stated: WAIS-R; modified Halstead-Reitan Battery (M-HRB); power spectral electroencephalograms (EEG). Intellectual and neuropsychological data for control subjects had been collected in a prior study (Fromm Auch & Yeudall, 1982). Power spectral EEGs were conducted on controls during the same time period that they were conducted on exhibitionists. Neuropsychological tests for the control and exhibitionist groups were administered by the same psychometric technicians. Similarly, one laboratory technician administered EEGs to both control and exhibitionist subjects.

Intellectual Assessment. The WAIS-R was administered by trained psychometricians currently employed as testers by the Psychology and Neuropsychology Departments at Alberta Hospital Edmonton. All testing was completed outside of work hours, and testers were paid competitive hourly wages. Administration and scoring procedures followed those presented in the WAIS-R Manual (Wechsler, 1981).

Neuropsychological Assessment. A modified Halstead-Reitan Battery (M-HRB) was administered during the evenings by three trained neuropsychological technicians. The technicians received hourly stipends comparable to the wages they received as testers for the Neuropsychology Department, Alberta Hospital Edmonton. In addition to the six tests administered for the present study, eight other neuropsychological indices were administered for future research considerations. The testers were not blind to the fact of an expected neuropsychological dysfunction in exhibitionists, but were uninformed as to the theoretical thesis and hypotheses of the present study. Moreover, the testers were unaware that only six of the 14 neuropsychological indices administered were of relevance to the present investigation. Descriptions of the tests used in this study are presented in the section titled Apparatus and Tests.

The M-HRB was divided into three sections estimated to take the same length of time to administer. A different section was randomly assigned to each of the testers, who concurrently administered their respective sections to different participants in separate test rooms. When all three testers were finished a section, the participants rotated to the next tester to complete a second section of the battery. Thus, each participant was rotated through all three testers, so that the order of the presentation of the three sections of the M-HRB was counterbalanced. The entire neuropsychological battery required approximately four hours to complete.

Electroencephalogram (EEG) Recordings. EEGs were administered by the EEG Laboratory Technician at Alberta Hospital Edmonton. The technician explained the procedure as she attached the electrodes on the frontal, parietal and temporal lobes (International 10-20 System). Recordings were obtained from each subject over five task-defined periods. Each period lasted from two to three minutes. The order of the tasks to be repeated for each participant was as follows: eyes open resting, eyes closed resting, verbal tasks, spatial task.

During the eyes open and eyes closed tasks, the participant was instructed to lie down, to be as relaxed as possible, and to try to think of nothing in particular. The verbal tasks consisted of the Vocabulary subtest of the WAIS-R (defining given words) and an Oral Word Fluency test (verbalizing as many words as possible starting with "F" for one minute, and repeating for the letter "S"). The verbal tasks were selected to primarily engage the dominant cerebral hemisphere (left). The spatial task consisted of the Block Design subtest of the WAIS-R. This task was selected to primarily engage the nondominant hemisphere (right).

Apparatus and Tests

Electroencephalogram (EEG)

Brain activity was monitored through 8 mm silverplated electrodes positioned on the scalp (International 10-20 System). The exact montage consisted of homologous placement of electrode pairs on the frontal (F-7, F-8), temporal (T-3, T-4, T-5, T-6), and parietal (P-3, P-4) lobes, and one reference electrode placed on the C_z midline. Amplification of the scalp potentials was obtained by using a Grass Model 6 Electroencephalograph precascaded to a bank of general-purpose bandpass filters to limit the overall amplification process to between 1 and 50 Hz. The overall level of amplification in the passband was set throughout to about 30,000, a level which seemed to provide a good resolution at the ±2.5 V input range. The electrical signal was decomposed into the following four frequency bands: 1 to 3 Hz, 4 to 7 Hz, 8 to 13 Hz, 20 to 40 Hz. The recordings from each scalp location were converted at the rate of 120/second. A ninth channel recorded with the EEG was used to indicate operator-flagged artifacts. A hand-held button was used to create a reject-on signal and this was recorded to indicate that the accompanying EEG should be excluded from the analysis because of excessive movement or eye-blink artifacts. Digitized recordings were stored on a magnetic medium and transferred later to a VAX 11/750 computer for subsequent analysis. The analysis consisted of dividing the recordings from each location into epochs of 128 consecutive samples, tapering these with a Hanning data window to restrict spectral leakage and Fourier transformation.

EEG Measures

The EEG is a measure of oscillating potentials primarily from the cerebral cortex (Nunez, 1981). That is, the EEG is a record of electrical activity from a large population of neurons where the electrical signal represents a waveform comprised of harmonic content. In the case of the power spectral EEG, the original waveform, or electrical signal, is decomposed into its different frequency components. The power spectral can be viewed as a multivariate time series.

There are four basic components used for EEG analysis within each frequency band: power, coherence, phase and oscillations. These components are clearly reflected in the 13 EEG factors comprising the heuristic model of brain functioning derived by Flor-Henry and Reddon (Flor-Henry, 1984) (see Table 5). For the present study, five EEG measures were selected a priori from the 13 EEG factors presented in Table 5. The measures were as follows: anterior --> posterior left intrahemispheric phase, left --> right interhemispheric crossed phase,

Table 5

EEG Factors[a]

Measure
1. Power
a. Anterior
b. Posterior
2. Coherence
3. Phase
a. Anterior Homologous
b. Posterior Homologous
c. Anterior --> Posterior Right Intrahemispheric
* d. Anterior --> Posterior Left Intrahemispheric
* e. Left --> Right Interhemispheric Crossed
f. Right --> Left Interhemispheric Crossed
4. Log of Right/Left Power Ratio
* a. Anterior
* b. Posterior
5. Oscillations
a. Anterior
* b. Posterior

Note. Measures marked with an asterisk were used in the present study.

[a] From an EEG study with normals by Flor-Henry (1984).

log right/left anterior power ratio, log right/left posterior power ratio, and posterior oscillations. The brain regions and postulated functions associated with this subset of variables were judged to be relevant to the theoretical premise of left-temporal and interhemispheric dysfunction in exhibitionists.

The first two EEG variables used in the present study were phase measures. Literally the word phase is used to indicate what phase or stage of a 360 degree cycle a waveform is in at a given time. In EEG analysis, phase is an estimate of the degree to which the stage of one waveform (event) systematically leads or lags behind the stage of a second waveform (event). Phase is measured between random events. Given the preceding discussion, anterior --> posterior left intrahemispheric phase can be defined as a measure estimating the systematic phase relationship between anterior and posterior events recorded from left brain regions (e.g., left-frontal to left-parietal). Left --> right interhemispheric crossed phase, is a measure estimating the systematic relationship between nonhomologous (crossed), interhemispheric events (e.g., left-frontal to right-parietal).

The third and fourth EEG measures selected for the present study were the log right/left anterior and log right/left posterior power ratios. Power, the primary component in EEG analysis, is the average amplitude of the waveform squared. Logarithms (base e) of the power ratios were used in order that deviations of the ratios from a value of 1 be reflected symmetrically and to facilitate interpretation (see Koles and Flor-Henry, 1981). The log right/left anterior power ratio is a measure of the relative right/left power at electrodes in homologous positions in the frontal lobe. The log right/left posterior power ratio is a measure of the relative right/left power at electrodes in homologous positions in the mid-temporal, post-temporal and parietal regions.

The fifth measure studied in the present investigation was posterior oscillations. This measure indicates the number of right/left hemispheric energy shifts through time for the mid-temporal, post-temporal and parietal regions.

Neuropsychological Tests

Seashore Rhythm Test, a subset of the Seashore Test of Musical Talent (Seashore, Lewis, & Saetveit, 1960), is included in the Halstead-Reitan Battery as a measure of nonverbal auditory perception. The task involves discriminating between like and unlike pairs of musical beats. The test yields three subscores, the total number of errors for each of the three subtests. The mean number of errors is used for data analyses.

Normative data are presented in Table 2. Test-retest (20 week interval) reliability coefficients for normal (N = 29) and neurologically impaired (N = 16) groups are $r = .37$ ($p<.05$) and $r = .58$ ($p<.05$) respectively (Matarazzo et al., 1974). This task relates to right temporal lobe functions (Lezak, 1983).

Seashore Speech Sounds Perception Test is an auditory acuity test, which assesses the individual's ability to discriminate between similar sounding consonants (Lezak, 1983). This test is included in the Halstead-Reitan Battery; see Reitan's manual (Reitan, Note 2) for complete instructions. Generally, the task involves selecting the consonant presented auditorily from a printed list of four words with similar consonants (e.g., theeks, zeeks, theets, zeets). Six subtests consisting of 10 consonants are presented in total. The score for this test is the sum of the total number of errors for each of the six subtests.

Normative data are presented in Table 2. Test-retest (20 week interval) reliability coefficients for normal (N = 29) and neurologically impaired groups (N = 16) are _r_ = .49 (_p_<.01) and _r_ = .67 (_p_<.01), respectively (Matarazzo et al., 1974). This task relates to left temporal lobe functions (Reitan & Davison, 1974; Russell et al., 1970).

Tactual Performance Test (TPT) is a tactile memory measure used in the Halstead-Reitan Battery. The major tasks are formboard trials; i.e., placing blocks of various shapes into the corresponding spaces on an upright formboard while blindfolded. After formboard trials are completed with the preferred hand, the nonpreferred hand and both hands, the blindfold is removed, and the individual is requested to draw the board from memory indicating the different form shapes. Four scores are obtained for this test: three "time to completion" scores for the three formboard trials and a memory score (i.e., total number of shapes reproduced).

Normative data are presented in Table 2. Normative group (N = 29) test-retest (20 week interval) reliability coefficients for TPT-time and TPT-memory are _r_ = .68 (_p_<.001) and _r_ = .40 (_p_<.05) respectively (Matarazzo et al., 1974). This spatial learning and recall test has been demonstrated to be particularly sensitive to right temporal and parietal dysfunction (Teuber, 1964).

Williams Verbal Learning is Williams' (1968) modification of the Word-Learning Test which was developed by Walton and his colleagues (1959). The test is basically a paired associate learning task involving words and their definitions. Extremely uncommon words with very concrete definitions were chosen to minimize the advantage of highly educated subjects (e.g., "gibus"—crash helmet; "vervaine"—flowering plant). The participant is presented with eight words and their definitions (e.g., "kermes" is a red dye--"kermes"). After all eight words have been presented, the Tester checks to make sure the participant was not familiar with the meaning of any of the words before the definitions were given. If so, alternate words are substituted for the familiar words. The tester then reads each word in turn and asks for the meaning. If the definition is incorrect, the tester gives the original definition, and then moves on to the next word. The words are always presented in the same order, and the test is continued until all the words are defined correctly in one trial, or until five trials have been completed. One score is obtained: the total sum of errors across trials.

Normative data are presented in Table 2. The superior performance by the normative group studied by Fromm Auch and Yeudall (1982), may be partially explained by the younger age of the comparison sample. An analysis of variance for Williams Verbal Learning scores obtained by Fromm Auch and Yeudall's entire normative group, showed a main effect of age [$\underline{F}(4, 185) = 3.55$, $\underline{p} < .01$]. This effect appears to be related to the greater number of errors made by normals over 40 years of age. Thus, the mean error obtained by Williams may have been increased by the subjects over 40 years (age range 17 to 45 years). The comparison subset of Fromm Auch and Yeudall's normal group used for this study ranged from ages 18 to 40, with only 1 individual over 33 years.

Least squares regression analyses of Williams Verbal Learning for Fromm Auch and Yeudall's entire normative sample (N = 180) showed no main effects for sex [$\underline{F}_{(1, 184)} = .90$; $\underline{p}>.34$] nor IQ [$\underline{F}_{(3, 177)} = .53$; $\underline{p}>.66$]. This task relates to left temporal lobe functions (Williams, 1968).

Williams Non-Verbal Learning is a measure of nonverbal learning developed by Rey (1941, as cited in Williams, 1968) which was normed by, and subsequently associated with Williams.

The material consists of four square boards in each of which are nine pegs. Eight of the pegs are inserted loosely in the holes, the ninth is fixed. The position of the fixed pegs is varied in the four boards.

The task involves discovering the fixed peg in each of the four boards, and subsequently being able to identify the fixed peg for each board. If an error is made, the participant is asked to find the fixed peg on that board once again, and then to continue with the next board. This procedure is continued until the participant succeeds in pointing to all four pegs in one full trial without error, or until five trials are completed. At this point, each of the boards are rotated 90^{0} and the procedure is repeated. Two scores are obtained: (1) the total sum of errors and (2) the total number of trials. The sum of errors is used in the data analyses.

Williams established norms for this nonverbal learning task based on 50 controls (ages 17-45) and 55 patients (ages 15-75) with various disorders. Williams' normative data along with that of Fromm Auch and Yeudall (1982) are presented in Table 2. It should be noted that Williams does not present the mean errors obtained when the boards are rotated 90°, nor the standard deviations. Consequently it is difficult to comment on the greater mean errors reported by Williams. This task relates to right temporal lobe functions (Williams, 1968).

Purdue Pegboard Test is a manual dexterity test developed by the Purdue Research Foundation (1948). The task requires the placing of pegs in a board with the left hand, right hand and then both hands simultaneously. Each condition is limited to 30 seconds. This part of the test yields three scores; i.e., the number of correctly positioned pegs for each condition.

Normative data are presented in Table 2. Reported test-retest reliability coefficients for male and female college students for right hand, left hand and both hands are .63, .60 and .68, respectively (Purdue Research Foundation, 1948). The slightly better performance by the Purdue Research Foundation's normative group relative to Fromm Auch and Yeudall's group, may reflect the inclusion of female scores and the seemingly younger age group in the Foundation's published norms (i.e., male and female college students versus males 18 to 40 years of age). This task relates to parietal lobe functions (Lezak, 1983).

CHAPTER V

RESULTS

Neuropsychological Test Indices

A linear discriminant function analysis was selected to examine the prediction that left temporal lobe dysfunction distinguishes exhibitionists from controls. This method computes from a set of multiple dependent (predictor) variables a linear composite, the discriminant function, that maximally separates criterion groups. Fletcher, Rice and Ray (1978) demonstrated the utility of this multivariate technique for examining group differences in neuropsychological research.

Table 6 shows the mean scores and standard deviations for each group on the six dependent variables to be used in the discriminant analysis. Correlation matrices were computed to examine the interrelationships of the dependent variables for exhibitionists and control groups (see Table B-1 and Table B-2).

Williams Verbal Learning and Speech Sounds Perception were significantly correlated in exhibitionists, $\underline{r} = .44$ [$\underline{t}_{(21)} = 2.27$; $\underline{p} \leq .05$], but not in controls, $\underline{r} = .10$ [$\underline{t}_{(89)} = .95$; $\underline{p} \geq .05$]. Williams Nonverbal Learning and Williams Nonverbal Learning-Rotated were significantly correlated for the exhibitionists, $\underline{r} = .54$ [$\underline{t}_{(21)} = 2.97$; $\underline{p} \leq .01$] and the controls $\underline{r} = -.30$ [$\underline{t}_{(89)} = 2.97$; $\underline{p} \leq .01$]. In controls,

Table 6

Mean Performance Scores for Temporal Indices as a Function of Group

		Group				
		Exhibitionist (n = 23)		Control (n = 91)		F^a
Variable	Measurement	Mean	(SD)	Mean	(SD)	
Seashore Rhythm	Errors	3.13	(2.70)	2.56	(1.99)	.97
Williams Nonverbal	Errors	1.39	(1.[illegible])	1.48	(2.09)	.08
Williams Nonverbal-Rotated	Errors	1.22	(2.13)	.64	(1.36)	1.52
Tactual Performance-Memory	Number Correct	7.65	(1.34)	8.42	(1.07)	6.59*
Speech Sounds	Errors	6.87	(3.83)	3.98	(2.16)	12.11**
Williams Verbal	Errors	12.65	(7.49)	3.88	(3.36)	30.04**

^{a}df = (6, 107)

* $p \leq .05$. ** $p \leq .01$

Williams Nonverbal Learning-Rotated and Tactual Performance Test-Memory were also significantly correlated $\underline{r} = -.30$ [$\underline{t}_{(89)} = 2.97$; $\underline{p} \leq .01$].

The subject to variable ratio was 3.8 to 1. For the two group design there is only one possible discriminant function. The derived function was significant; Wilks lambda = .57, $\underline{p} \leq .01$ (see Table 7). The group centroids for the function were .07 for the controls and 2.17 for the exhibitionists. The standardized discriminant coefficient weights are shown in Table 8. The frequency distribution of discriminant scores for both groups is illustrated in Figure 1. The use of a discriminant score greater than one as a cut off point, resulted in the accurate classification of 82% (19/23) of the exhibitionists and 83.5% (76/91) of the controls.

Interpretation of the discriminant function is traditionally facilitated by the standardized discriminant coefficient weights and stepwise analysis. However, both these procedures have been demonstrated to be potentially unreliable for interpreting the discriminant function, i.e., determining the importance of individual neuropsychological variables for differentiating groups (Fletcher, Rice & Ray, 1978). The problem is that variables are ranked according to their independent contributions to overall variance. Consequently, variables only slightly correlated with the discriminant function can be ranked higher in the analysis just because of their independent contribution to overall variance. Variables highly correlated with the discriminant function can receive low ranks if a moderately correlated variable is selected earlier in the analysis.

Table 7

Significance of the Discriminant Function for Neuropsychological Variables

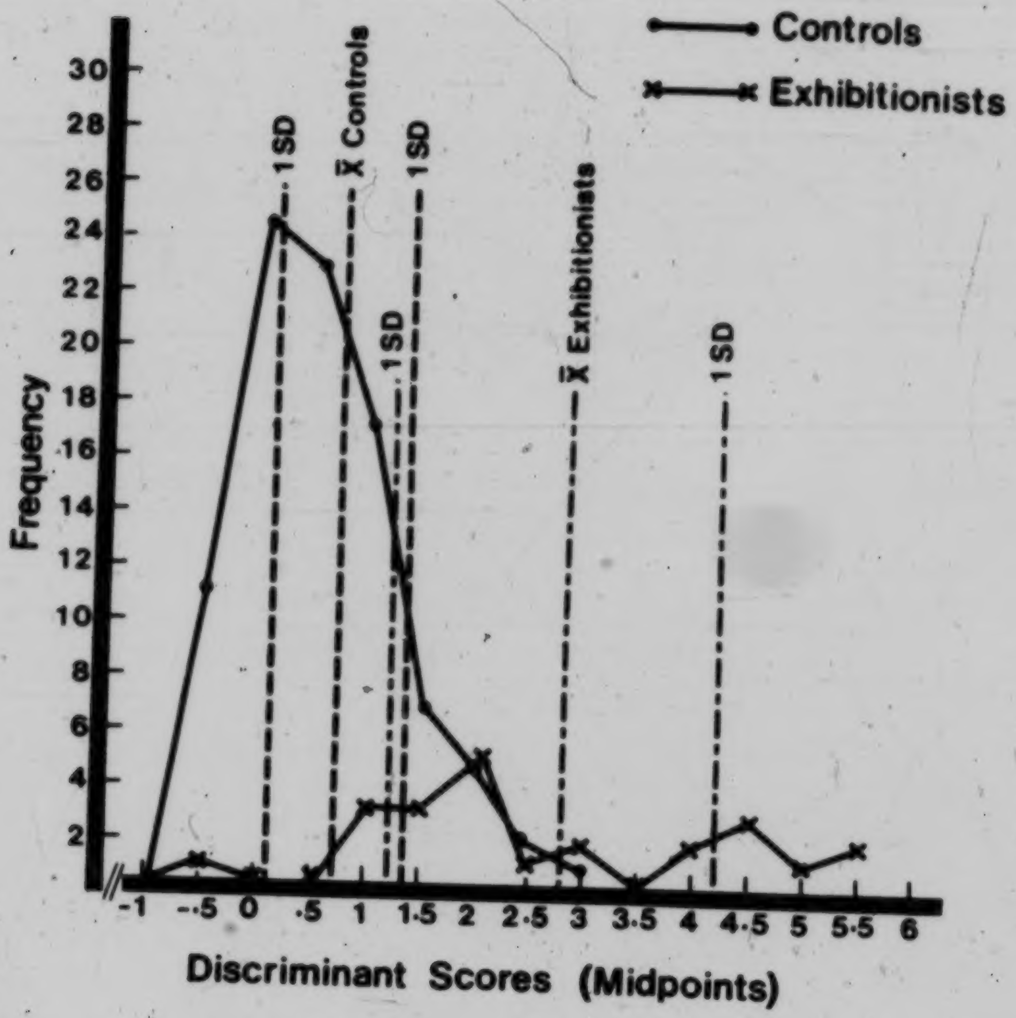
No.	Eigenvalue	Percentage	Canonical Correlation	Wilks lamda	chi square	df	significance
1	.7481	100	.65	.57	60.88	6	≤.01

Table 8

Standardized Discriminant Coefficient Weights for Neuropsychological Variables

Variable	Weight
Seashore Rhythm	.06
Williams Nonverbal	-.03
Williams Nonverbal-Rotated	.09
Tactual Performance Test-Memory	-.08
Speech Sounds	.09
Williams Verbal	.20

Figure 1. Frequency distribution of discriminant scores for exhibitionists ($\underline{n}$=23) and controls ($\underline{n}$=91).



Because of the potential unreliability of stepwise analyses, and the unknown effect of unequal covariance matrices on stepwise procedures, the present analysis used a canonical correlation procedure to interpret the discriminant function. In this procedure each dependent (predictor) variable is correlated with the canonical variate, which for categorical criterion groups is actually the discriminant function maximizing group separation. The magnitude of the correlation indicates the relative variable contribution to group separation (Fletcher et al., 1978; Huberty, 1975; Tatsuoka, 1973). In contrast to standardized coefficient and stepwise methods, the canonical variate procedure does not eliminate redundancy, i.e., shared variance among predictors.

Results of the canonical analysis indicated that Williams Verbal Learning ($r = .97$) had the greatest correlation with the discriminant function (see Table 9). Examination of the group means for Williams Verbal Learning revealed that the exhibitionists ($X = 12.65$, $SD = 7.49$) made significantly more errors relative to controls ($X = 3.88$, $SD = 3.36$): $F_{(6,107)} = 30.04$; $p \leq .01$). Figure 2 illustrates the frequency distribution of Williams Verbal Learning for both groups. The use of a score greater than six on Williams Verbal Learning resulted in the accurate classification of 65% (15/23) of the exhibitionists and 90% (82/91) of the controls. Williams Verbal Learning was not significantly correlated with Full Scale IQ in exhibitionists ($r = -.37$; $p > .05$), nor in controls ($r = -.17$; $p > .05$).

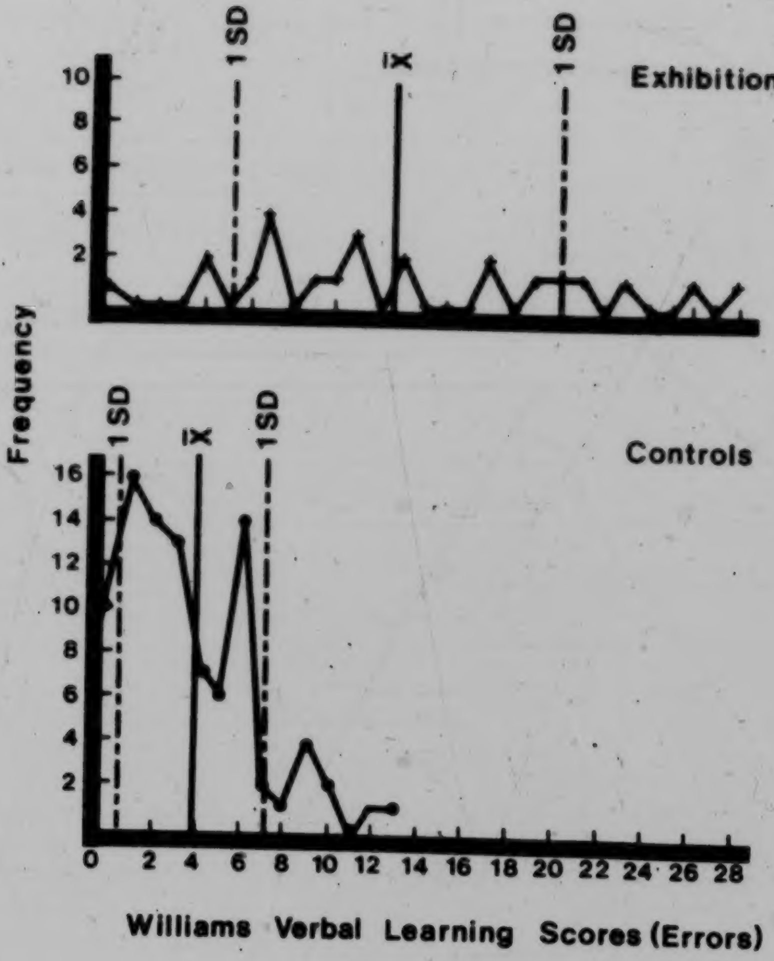
Speech Sounds Perception ($r = .62$) and Tactual Performance Test-Memory ($r = -.41$) had the next highest correlations with the discriminant function. Again, exhibitionists performed significantly poorer than did

Table 9

Correlations of Discriminant Function (Canonical Variate) with Dependent Variables

Variable	Correlation
Seashore Rhythm	.18
Williams Nonverbal	-.02
Williams Nonverbal-Rotated	.20
Tactual Performance Test-Memory	-.41
Speech Sounds	.62
Williams Verbal	.97

Figure 2. Frequency distribution of Williams Verbal Learning Scores for exhibitionists (n=23) and controls (n=91).



controls on Speech Sounds Perception [F (6,107) = 12.11; $p \leq .01$] and Tactual Performance Test-Memory [F (6,107) = 6.59; $p \leq .05$]. Speech Sounds Perception was significantly correlated with Full Scale IQ in exhibitionists ($r = -.41$; $p \leq .05$), but not in controls ($r = -.19$; $p > .05$). Tactual Performance Test-Memory was not significantly correlated with Full Scale IQ in exhibitionists ($r = .04$; $p > .05$), but was in controls ($r = .31$; $p \leq .05$).

Seashore Rhythm, Williams Nonverbal Learning and Williams Nonverbal Learning-Rotated shared little variance with the discriminant function (see Table 9). Moreover, exhibitionists and controls did not significantly differ on any of these variables.

The second and third hypotheses predicted that exhibitionists would have more difficulty on tasks requiring both hands relative to their own performance with a single hand, and relative to performance with both hands by controls. To test the latter hypotheses, a multivariate analysis of variance was conducted with Purdue Pegboard and Tactual Performance Test scores as a function of group and lateralization (preferred, nonpreferred, both hands) factors. Mean performance scores and standard deviations for both tests are presented in Table 10. The main effect of group was significant ($T^2 = 6.25$, $F_{(92,109)} = 3.10$, $p \leq .01$). Overall time levels on Tactual Performance Test were greater for exhibitionists (X = 242.70, SD = 108.00) than for controls (X = 203.20, SD = 114.00): $F_{(1,110)} = 5.16$; $p \leq .05$. This result indicated that exhibitionists required significantly more time to complete the Tactual Performance Test than did controls. The groups did not differ significantly on the Purdue Pegboard.

Table 10

Mean Performance Scores for Groups on Tasks with Preferred (P), Nonpreferred (NP) and Both (B) Hands

Variable	Exhibitionist (n=23) Mean	(SD)	Control (n=91) Mean	(SD)
Purdue Pegboard - P	15.52	(1.65)	15.67	(1.79)
Purdue Pegboard - NP	14.70	(1.64)	15.24	(1.92)
Purdue Pegboard - B	12.22	(1.20)	12.81	(1.47)
Tactual Performance - P	336.55	(97.01)	288.60	(123.04)
Tactual Performance - NP	232.37	(84.95)	199.70	(77.74)
Tactual Performance - B	159.04	(52.92)	121.10	(68.64)

Note. Purdue Pegboard scores indicate the number of pegs placed; the higher the score, the better the performance. Tactual Performance scores indicate the time taken to complete the task; the lower the score, the better the performance.

The main effect of lateralization was significant, $\underline{T}^2 = 1063.38$; $\underline{F}_{(4,107)} = 258.59$; $\underline{p} \leq .01$. Univariate analysis of variance results for both dependent measures indicated that levels of lateralization significantly differed for Purdue Pegboard [$\underline{F}_{(2,109)} = 228.54$; $\underline{p} \leq .01$] and Tactual Performance Test [$\underline{F}_{(2,109)} = 258.83$; $\underline{p} \leq .01$]. Newman-Keuls Test for a posteriori comparisons indicated that the Purdue Pegboard nonpreferred-hand condition ($\bar{X} = 15.12$) did not significantly differ from the Purdue Pegboard preferred-hand condition ($\bar{X} = 15.64$). All other lateralization conditions differed significantly ($\underline{p} \leq .01$) for both Purdue Pegboard and Tactual Performance Test (see Table 11).

The overall group by lateralization factor (preferred, nonpreferred, both hands) was not significant. This finding indicated that the shape of the curves for exhibitionist and controls across levels of the lateralization factor did not significantly differ (see Figures 3 and 4).

Table 11

Newman-Keuls Test for A Posteriori Comparisons Between Lateralization Conditions for Purdue Pegboard and Tactual Performance Means

Purdue Pegboard	X Both	X Non-preferred	X Preferred
X Both = 12.69	–	2.43*	2.95*
X Nonpreferred = 15.12		–	.52
X Preferred = 15.64			–
Tactual Performance Test			
X Both = 128.9	–	77.5*	169.5*
X Nonpreferred = 206.4		–	92.0*
X Preferred = 298.4			–

* $p \leq .01$

Figure 3. Purdue Pegboard scores across lateralization conditions as a function of group.

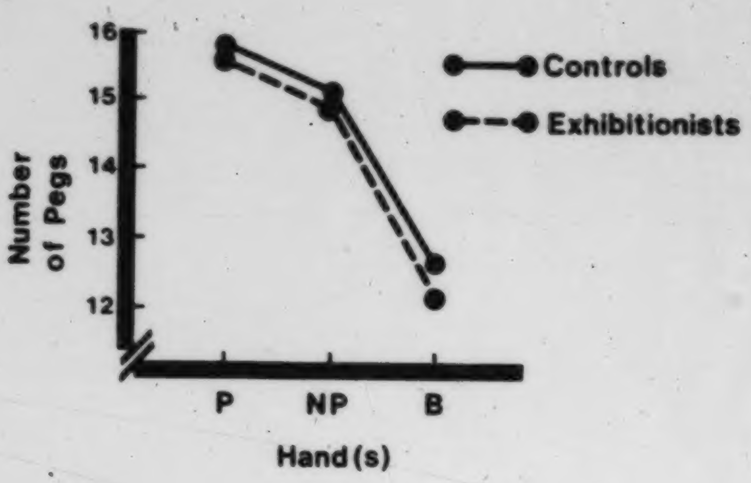
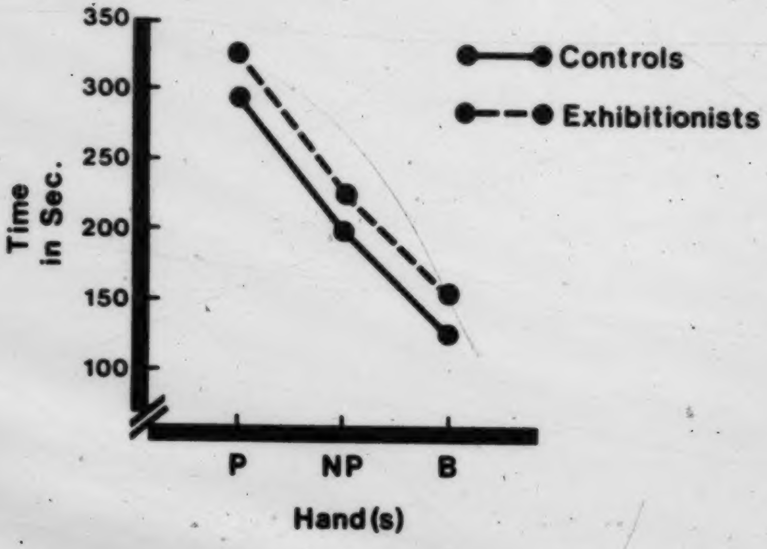


Figure 4. Tactual Performance Test scores across lateralization conditions as a function of group.



Electroencephalograph (EEG) Indices

The Hotelling T^2 Test of differences between mean vectors was chosen to examine the hypothesis that exhibitionists would differ significantly from controls in the alpha frequency on the following four EEG measures: anterior --> posterior left intrahemispheric phase; left --> right interhemispheric phase crossed; log right/left anterior power ratio; log right/left posterior power ratio. A non-statistical survey of the means for the EEG measures resulted in the selection of the "eyes open" task condition to examine group differences. The means and standard deviations for the 13 EEG measures for the five task conditions are presented in Appendix C (see Table C-1 and C-2).

The results of the Hotelling T^2 test indicated that exhibitionists differed significantly from controls on the EEG measures, $\underline{T}^2 = 20.63$; $\underline{F}_{(4,33)} = 4.73$; $\underline{p} \leq .005$. Table 12 summarizes the results of the follow-up analysis of variance conducted for each of the four EEG measures. The reduced log right/left anterior power ratio in exhibitionists [$\underline{F}_{(4,33)} = 2.49$; $\underline{p} \leq .06$], indicated increased left-frontal power relative to right frontal-power in exhibitionists compared to controls. Anterior --> posterior left intrahemispheric phase lead also tended to be reduced in exhibitionists [$\underline{F}_{(4,33)} = 1.69$; $\underline{p} \leq .25$].

Hotelling T^2 Tests were repeated for the same four EEG measures in the other three frequency bands (i.e., 1-3 Hz, 4-7 Hz, 20-40 Hz). The results reported below should be considered as a preliminary investigation across frequencies, and must be viewed with caution because of the decrease in statistical power that occurred as a result of conducting a series of multivariate analyses. The significant group

Table 12

Univariate Follow-up Analyses for Hotelling T^2 Test[a]

for EEG Measures in the Alpha Band

EEG Measure	Mean Controls	 Exhibitionists	F[b] Ratio	Probability Level
Anterior —> Posterior L.[c] Intrahem.[d]	-.22	.49	1.69	.18
L. — > R. Interhem. Crossed	-.05	.51	1.23	.32
Log R./L. Anterior Power	-.50	.38	2.49	.06
Log R./L. Posterior Power	.08	.02	.02	1.00

Note. For both groups $n = 19$

[a] $T^2 = 20.63$; $F_{(4,33)} = 4.73$; $p \leq .005$.

[b] DF = 4,33. [c] L. = left; R. = right. [d] Hem = Hemispheric

differences observed in the alpha frequency were also indicated for the 1-3 Hz band [$\underline{T}^2$ = 16.91; $\underline{F}$ = $_{(4,33)}$ = 3.88; $\underline{p} \leq .01$], the 4-7 Hz [$\underline{T}^2$ = 15.33; $\underline{F}_{(4,33)}$ = 3.51; $\underline{p} \leq .05$], and the 20-40 Hz band [$\underline{T}^2$ = 14.27; $\underline{F}_{(4,33)}$ = 3.27; $\underline{p} \leq .05$]. Furthermore, in both the theta frequencies (i.e., 1-3 Hz and 4-7 Hz) and the beta frequency (i.e., 20-40 Hz), the results of the follow-up analyses of variance indicated that the significant group differences were primarily caused by reduced log right/left anterior power in exhibitionists relative to controls. Summary tables for the univariate follow-up analyses for the theta and beta frequencies are found in Appendix C (see Tables C-3, C-4 and C-5).

The prediction of reduced posterior oscillations in exhibitionists for the alpha band, was tested by conducting an analysis of variance for posterior oscillations as a function of group and task factors, where levels of task were treated as repeated measures. The results are presented in Table 13. The main effects relevant to the hypothesis, that is, the main effect of group and the group by task interaction were not significant at the .05 level. However, the F ratio for the main effect of group suggested a trend in the nonpredicted direction, $\underline{F}_{(1,37)}$ = 3.24; $\underline{p} \leq .08$ (see Table 14). That is, the exhibitionists ($\bar{X}$ = .20) tended to show greater right/left energy oscillations than did controls ($\bar{X}$ = -.21). The main effect of task was significant, $\underline{F}_{(4,152)}$ = 55.23; $\underline{p} \leq .001$. Scheffe comparisons of the unweighted means for the five task conditions indicated that all conditions differed significantly from the eyes open and the eyes closed conditions, and that the vocabulary, oral word fluency and block design conditions did not differ significantly from each other (see Table 15).

Table 13

ANOVA Results for Posterior Oscillations as a Function of Group and Task, Where Levels of Task are Treated as a Repeated Measure

Source of Variation	Sum of Squares	DF	F Ratio	Probability
Between Subjects	93.03	37		
Group	7.68	1	3.24	.08
Within Group	85.35	36		
Within Subjects	94.77	4	55.23	.00
Task	56.57	152		
Group x Task	1.33	4	1.30	.27
Task X Subjects within Group	36.87	144		

Table 14

Unweighted Group Means for Posterior Oscillations

	Group	
	Controls	Exhibitionists
X	-.21	.20

Table 15

Scheffé Comparisons for the Main Effect of Task

	Task				
	Eyes Open (EO)	Eyes Closed (EC)	Vocab- ulary (VOC)	Oral Word Fluency (DWF)	Block Design (DB)
Unweighted Mean	-.28	-.95	.35	.52	.34

Task Levels	Contrast	F Ratio
EO-EC	.68	8.54 **
EO-VOC	-.62	7.19 **
EO-OWF	-.79	11.62 **
EO-BD	-.62	7.05 **
EC-VOC	-1.30	31.41 **
EC-OWF	-1.47	40.07 **
EC-BD	-1.30	31.10 **
VOC-OWF	-.17	.53
VOC-BD	.01	.00
OWF-BD	.17	.57

** $p \leq .01$

CHAPTER VI

DISCUSSION

The theoretical thesis for this study was that the etiological basis of exhibitionism is related to cerebral abnormalities manifested as left-temporal lobe dysfunction and interhemispheric perturbance (Flor-Henry, 1980). Investigation of the premise was directed by five hypotheses: the first three predicted differences in performance on selected neuropsychological indices between exhibitionists and controls, while the fourth and fifth predicted significant differences in EEG measures for these two groups. In this section, the results will be evaluated and interpreted with respect to each of the research hypotheses and hence with respect to the theoretical thesis underlying the hypotheses. Limitations of the study, as well as theoretical and practical implications, will be addressed.

Hypothesis I predicted that exhibitionists would make significantly more errors than controls on neuropsychological tests tapping left-temporal lobe functions (i.e., Speech Sounds Perception and Williams Verbal Learning). The results supported this prediction, indicating that exhibitionists differed significantly from controls on tasks reflecting left-temporal lobe functioning and did not differ from controls on tasks reflecting right-temporal lobe functioning. These results were not judged to be a function of intelligence. Williams Verbal Learning, the single left-temporal indice that contributed most to group separation, was not significantly correlated with Full Scale IQ in exhibitionists nor in controls. Speech Sounds Perception, the next single index contributing most to group separation, was significantly correlated with Full Scale IQ in exhibitionists but not in controls. The latter correlation itself, was not judged to be clinically significant given Williams Verbal Learning was not significantly correlated with a measure of intelligence, and that the right temporal lobe counterpart, Seashore Rhythm, was not significantly related to a measure of intelligence.

The fact that Tactual Performance Test-Memory also significantly differentiated exhibitionists from normals, may represent an inaccuracy in the classification of this task as a spatial learning and memory task usually associated with right hemisphere dysfunction (Lezak, 1983; Teuber, 1964). For example, De Renzi (1968) reported superior performances on the Tactual Performance Test-Memory for patients with right hemisphere dysfunction. Evidence suggesting this task is sometimes shown to be related to left (e.g., De Renzi, 1968) and at other times to right temporal lobe dysfunction (e.g., Teuber, 1964), may be related to the nature of the task. Although the task involves the recall and drawing of geometric designs previously handled (i.e., right-temporal functions), it also may encourage the use of verbal mediations for the memory task because the geometric forms represent shapes with common verbal labels (e.g., star, square, circle, cross) (i.e., left-temporal functions). The evidence which allows one to question the classification of the Tactual Performance Test-Memory is unique in the sense that the other neuropsychological marker tasks have presented a much more consistent, and hence more clear-cut alignment with identified cerebral regions. Another possibility for the exhibitionists' poorer performance, which also relates to the apparent left and right functions involved in this task, is that Tactual Performance Test-Memory is reflective of interhmeispheric processing. The basis for this speculative interpretation, is derived from Sperry's (1974) writings on the specific role of the forebrain commissures in mnemonic functions. More specifically, Sperry (1974) reported that

> any storage, encoding, or retrieval process dependent normally on the integration between symbollic functions in the left hemisphere and spatio-perceptual mechanisms in the right, would also be disrupted by commissurotomy (p.15).

Although commissurotomy would appear to be the ultimate form of interhemispheric perturbance, tasks involving both symbollic (left) and spatio-perceptual (right) processes, may also be expected to reflect less extreme interhemispheric perturbances.

The reported irrational and/or inappropriate cognitive mediations characterizing exhibitionists (e.g., Hackett, 1971; Wickramasekera, 1980), may be directly related to the neuropsychological results indicating left-temporal lobe dysfunction. Left-temporal lobe functions have been associated with subjective consciousness, and have been postulated to play an important role in integrating information from the external world with internal experience (Williams, 1969). The neuropsychological support for left-temporal lobe dysfunction in the present study, led to a pilot study using the Rey Auditory-Verbal Learning Test (AVLT) with a group of exhibitionists and assaultive males (see Appendix D). The AVLT was designed to measure immediate memory span and retention, provide a learning curve, reveal learning strategies (or their absence), as well as to examine qualitative dimensions such as interference, confusion, repetition or confabulation tendencies, for word-lists. Administration of the test consisted of five verbal presentations with recall of a 15-word list, followed by the presentation and recall of a second 15-word list, followed by a sixth recall trial (without presentation) of the first list. Retention was assessed with a seventh recall trial of the first list 30 minutes after the sixth recall trial. The results indicated that exhibitionists tended to learn and retain less than did a group of apprehended, assaultive males, and that both exhibitionists and assaultive males recalled significantly fewer words on the fifth and final learning trial than did the labor, student, and professional control groups reported by Rey (1964, as cited in Lezak, 1983). Moreover, the qualitative analysis indicated that more exhibitionists (80%) made repetition errors than did assaultive males (40%), and that only exhibitionists (50%) made intrusion, association or confabulation errors. Based on the work of Lezak (1983) that compared controls to braindamaged patients, the latter findings were interpreted to indicate that exhibitionists had difficulty in maintaining the distinction between external information and internal or subjective associations. These findings were judged to be particularly important, given that the exhibitionists, the group that learned and retained less while making more errors, had significantly more education than did the assaultive males. Thus, the neuropsychological findings, combined with the AVLT results, suggest that the cerebral dysfunction identified in exhibitionists may affect left-temporal functioning in such a way that abnormal subjective associations are mistakenly viewed as, or thought to be validated by, external information.

Temporal dysfunction that affects the processing of external information would also be consistent with and possibly explain the evidence indicating that exhibitionists reported a significantly greater number of atypical sexual fantasies than did other sexual and nonsexual offenders (Gebhard et al., 1965). Moreover, the identification of dysfunction that distorts reality in favor of subjective associations has important implications for treatment. For instance, the common goal of modifying irrational cognitions in otherwise divergent treatment approaches, may explain the success of some psychotherapy and behavioral treatments, as well as provide a framework within which to predict the relative efficacy of various therapeutic approaches. That is, treatment efficacy would be postulated to be a function of the extent to which a given technique enabled the desired modification or extinction of distorted cognitive perceptions. Such a model is congruent with the literature reviewing treatment outcomes. For example, Wickramasekera's In-Vivo-Aversive Behavior Rehearsal (I-V-ABR) technique, which stages an overt confrontation between external and internal reality by having unknown men and women give feedback while the subject engages in the exposure act, has been shown to be the most effective treatment in terms of the amount of treatment time required, and the maintenance of positive treatment outcomes (Wickramasekera, 1980). The adverse side-effects of I-V-ABR (Wickramasekera, 1980), however, may favor the use of other behavioral treatments such as assisted covert sensitization (e.g., Maletzky, 1980) and electric-shock aversive therapy (e.g., Evans, 1970) that also focus on modifying inappropriate mediations and have been demonstrated to effect positive treatment outcomes (Blair & Lanyon, 1981).

Hypotheses II and III predicted that exhibitionists would have more difficulty on tasks requiring both hands relative to their own performance with a single hand, and relative to performance with both hands by controls, respectively. Neither of these hypotheses was supported, suggesting that this was not an appropriate measure of interhemispheric perturbance, and/or that exhibitionists do not deviate significantly from controls on this particular measure of interhemispheric functioning.

Hypothesis IV, the first of the EEG hypotheses, predicted that exhibitionists would display deviant EEG characteristics which affect temporal lobe functions in the alpha frequency band on the following EEG measures: anterior —> posterior left intrahemispheric phase, left —> right interhemispheric phase, log right/left anterior power ratio, log right/left posterior power ratio. The multivariate analysis selected to test this hypothesis indicated that exhibitionists significantly differed from controls on these EEG indices in the resting cognitive state, "eyes open." Univariate analysis for each of the EEG measures showed that group separation was primarily obtained on the log right/left anterior power ratio, and to a lesser extent on the anterior --> posterior left intrahemispheric phase measure. The reduced log right/left anterior power ratio indicated increased left-frontal power relative to right-frontal power in the exhibitionist group. Increased power is associated with decreased activation, which suggests, given the regulating and control functions of the frontal lobe over information from the posterior cortex (Lezak, 1983), a reduction in neural inhibition. Though the complex nature of brain functioning and the technological limitations of the EEG procedure preclude the identification of the source responsible for the apparent abnormality, it seems appropriate to speculate that decreased activation in the left-frontal region would imply reduced inhibition that may in turn affect left anterior and posterior functions. The data also suggested that this finding was indicated to varying degrees for both of the theta and the beta frequencies.

Hypothesis V predicted reduced posterior oscillations in exhibitionists for the alpha frequency. The results did not support a deviation in the predicted direction. However, relative to controls, a trend was indicated for exhibitionists to produce a greater number of right/left energy shifts across all tasks ($\underline{p} \leq .08$). If the latter trend is viewed as an index of deviation suggesting interhemispheric perturbance of some nature, then the results would seem to be congruent with the results of the first hypothesis indicating reduced neural inhibition. The latter claim is based on Sperry's (1974) conclusion that the transactional aspects of interhemispheric processing are almost entirely inhibitory in nature. That is, atypical oscillations may be indicative of perturbed interhemispheric functioning, which, like the indication of increased right/left-frontal power, may suggest reduced neural inhibition in exhibitionists.

The neuropsychological and neurophysiological results provide partial support for Flor-Henry's (1980) cerebral model of sexual deviations. First, the neuropsychological findings supported the prediction of left-temporal lobe dysfunction. Secondly, Flor-Henry's premise that the temporal dysfunction provides the substrate for inappropriate mediations of environmental events, was supported by the AVLT results indicating that exhibitionists may have difficulty in maintaining distinctions between external information and subjective experience or associations. Thirdly, the EEG results for exhibitionists revealed significant differences from controls on measures that theoretically would be expected to affect left anterior and posterior brain functioning. There were no significant findings to support Flor-Henry's contention that left hemispheric dysfunction leads to or becomes associated with perturbed interhemispheric interactions. The EEG measure selected to assess interhemispheric functioning showed a trend towards deviational right/left energy shifts in exhibitionists; however, this trend did not represent a significant deviation from controls. Similarly, a comparison of single and both hand performances on neuropsychological motor indices did not reveal predicted interhemispheric dysfunction in exhibitionists.

The identification of temporal lobe dysfunction in a group arrested for exhibitionism, suggests further support for the role of the temporal lobe in sexual behavior that has been indicated by ~~ablative~~ research with animals (e.g., Kluver & Bucy, 1939), and research with individuals with identified temporal abnormalities (e.g., Kolarsky et al., 1967). The learning and memory functions of the temporal lobe, combined with the strengthened link between the temporal lobe and sexuality, suggests that the temporal region may play a key role in the discrete sexual learning system postulated to exist in males (Dimond, 1980). Theoretically, it would follow that temporal lobe dysfunction may affect the learning system so that the individual is vulnerable to acquiring deviant sexual expressions, particularly in consideration of the "almost exclusive" incidence of exhibitionism in males (e.g., McConaghy, 1982), and the research suggesting a functional vulnerability of the left-hemisphere in men (Dimond, 1980; McGlone, 1977; Flor-Henry, 1978). It is difficult to speculate what other brain areas may be critical to such a sexual learning system. However, the results of the present EEG analysis would suggest that reduced neural inhibition plays a role in adversely affecting the learning system. Reduced inhibition could be further postulated to strengthen what research has shown to be a greater capacity for sexual learning and conditioning in male mammals relative to females (Beach and Ford, 1951). The latter may in turn offer a heuristic explanation for the existence of individuals with multiple sexual deviations (e.g., Brownell et al., 1977), and the seemingly significant role that atypical sexual fantasies play in maintaining exposure behavior (Evans, 1980). Moreover, the reduction of control associated with sexual arousal would seemingly be exacerbated by the decrease in neural inhibition that was indicated in the exhibitionists in the present investigation.

A limitation in the design of the present study necessitates a caveat regarding the generalization of the results supporting a cerebral model of sexual deviation. First, the exhibitionist group in the present study is a subset of the general exhibitionist population, i.e., arrested exhibitionists, that may not be representative of the nonarrested members of this paraphiliac group. Secondly, the "normal male" comparison groups used in the present study make it impossible to address whether the deviant neuropsychological and neurophysiological characteristics evidenced in this exhibitionist group are a general characteristic of all sexual deviation groups, or a more general characteristic of all apprehended offenders (sexual and nonsexual). The results of the AVLT pilot study in Appendix D are encouraging in that they show a trend for exhibitionists to do less well quantitatively than significantly less educated assaultive males who have been apprehended. In addition, exhibitionists showed problems in maintaining distinctions in external versus internal information which were not evidenced at all in the nonsexual, apprehended offenders.

It should be noted that the existence of temporal dysfunction in nonsexual criminals would not in itself negate the role of temporal dysfunction in the etiology of sexual deviations. The whole concept of biological and biochemical theories of pychopathology suggests that neurophysiological abnormalities may exist in antisocial personalities and individuals who chronically abuse drugs and commit misdemeanors while intoxicated (Flor-Henry, 1978; Goldstein & Shelly, 1980). Moreover, the learning and mediation function associated with the temporal lobes suggests that criminals who have difficulty adjusting or learning to live by the rules of society, may have some temporal dysfunction. However, Dimond's conceptualization of a discrete learning system for sexual behavior, combined with the preliminary results of the AVLT study in this research endeavor, suggest that a qualitative difference in the nature of temporal dysfunction, as well as the other cerebral systems that are impaired or affected, will differentiate men with sexual deviations from nonsexual offenders. To that extent future research should direct efforts towards investigating the existence of a sexual learning system separate from a more general learning system. This would necessitate the identification of existing, and most likely the development of new neuropsychological assessment tools to qualitatively assess different types of temporal dysfunction. This heuristic model would suggest that chronicity and frequency of exposure would be related to the degree of dysfunction in the discrete sexual learning system, whereas, the degree of nonsexual offences in addition to exposure would be a function of the extent of impairment to the general learning system. Indirect support for the discrete learning system for sexual systems is the ability for many exhibitionists to achieve in academic settings and to maintain professional roles in the community. That is, many exhibitionists described in the literature would not appear to have a generalized problem learning socially acceptable behavior patterns. Moreover, the trend for exposure patterns to emerge in mid-adolescence coincides with puberty, and what may be the maturation of the postulated sexual learning system.

In addition to studying nonsexual offenders, future research should also investigate other identified paraphiliac groups to determine whether the present findings for exhibitionists apply to sexual deviants in general. The generalizability of left hemisphere dysfunction is tentatively suggested by reports that the treatment of one paraphilia reduces a second nontreated paraphilia while leaving normal arousal patterns intact (Alford, Webster & Sanders, 1980). The use of large samples when studying other sexual and nonsexual forensic groups, should be encouraged in order to ensure sufficient statistical power to examine a greater number of dependent variables. The results of the present study suggest that the frontal lobes would also be an important region to examine in efforts to further unravel the cerebral mechanisms related to sexual deviations. The advantages and disadvantages of studying neurophysiological characteristics with the PET scan should also be considered.

Finally, the important role of exposure fantasies in exhibitionism suggests that another avenue for future research would be the examination and comparison of the neurophysiological characteristics of exhibitionists while they are engaging in exposure fantasies, "normal" sexual fantasies, and nonsexual fantasies. An alternative approach would be to monitor neurophysiological characteristics while exhibitionists are viewing exposure slides, "normal" sexual scenes, or nonsexual scenes. The latter approach may be more informative given the difficulty clients are likely to have relaxing and fantasizing while hooked up to the EEG equipment. The results of such research would provide neurophysiological profiles for sexual response patterns during deviant and "normal" arousal conditions, and provide further information about the brain areas involved in sexual arousal.

Footnotes

[1] Fromm Auch, D., Yeudall, L. T., & Stefanyk, W. Manual for the Administration of the AHE Neuropsychological Test Battery. Unpublished Manuscript, 1978.

[2] Reitan, R. M. Manual for Administration of Neuropsychological Test Batteries for Adults and Children. Unpublished Manuscript, Indianapolis, 1969.

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APPENDIX A

SUBJECT CONSENT FORM

APPENDIX A

ALBERTA HOSPITAL, EDMONTON

SPECIAL AUTHORIZATION AND CONSENT

1. I hereby authorize the Alberta Hospital, Edmonton and Linda Baker and/or her delegated assistants to perform the following procedure(s)

   ______________________ on ________________________ on or about the
   [procedure(s)] [name of patient or myself]

   ________________________ day of _________________________, 19___.

2. The procedure(s) listed in Paragraph 1 have been explained to me by Linda Baker and I understand the nature of the procedure(s).

3. I recognize and understand that, during the course of the procedure, unforeseen or unknown conditions may necessitate additional or different procedures than those set forth in Paragraph 1. I further authorize and request that Linda Baker, her assistants or her designees perform such additional or different procedures as are in her professional judgment necessary.

4. I understand and acknowledge that no guarantees have been made to me as to the results of the procedure(s).

Date: ______________________________

Time: ______________________________ ________________________________
Signature of patient

READ OVER AND EXPLAINED to the above patient, who stated that he/she understood the contents of the above document and affixed his/her signature in my presence.

____
Signature of witness

IF THE PATIENT IS UNABLE TO SIGN OR IF CONSENT OBTAINED BY TELEPHONE, COMPLETE THE FOLLOWING:

The patient is unable to sign because ________________________________
____

As the closest relative or legal guardian I hereby sign on his/her behalf.

Date: ______________________ Signature: ____________________________

Time: ______________________ Relationship: ________________________

Witness: ___________________ **Witness: ___________________________

**NOTE: In case of telephoned consent, there should be two witnesses' signatures obtained above.

Form MR-16 Rev. 8-10-74.

APPENDIX B

CORRELATION TABLES FOR NEUROPSYCHOLOGICAL VARIABLES

APPENDIX B

Table B1

Correlations Between Neuropsychological Variables, IQ Scores and Age for Exhibitionists (n=23)

Variable	1	2	3	4
1. Age	-	-.07	-.02	.03
2. WAIS-R - FSIQ		-	-.31	.02
3. Seashore Rhythm (E)			-	.05
4. Williams Nonverbal (E)				-
5. Williams Nonverbal - Rotated (F)				
6. Tactual Performance - Memory (F)				
7. Speech Sounds (E)				
8. Williams Verbal (E)				
9. Perdue Pegboard - P (F)				
10. Perdue Pegboard - NP (F)				
11. Perdue Pegboard - B (F)				
12. Tactual Performance - P (T)				
13. Tactual Performance -NP (T)				
14. Tactual Performance - B (T)				

Variable	5	6	7	8	9	10
1. Age	.04	.07	.34	.21	-.22	-.39
2. WAIS-R - FSIQ	-.35	.04	-.41*	-.37	-.18	-.09
3. Seashore Rhythm (E)	.05	.31	.37	-.17	-.36	.07
4. Williams Nonverbal (E)	.54**	-.15	-.33	.00	-.16	-.16
5. Williams Nonverbal - Rotated (F)	-	-.31	-.21	-.16	.04	-.42*
6. Tactual Performance - Memory (F)		-	-.28	-.29	.11	-.15
7. Speech Sounds (E)			-	.44*	-.30	.08
8. Williams Verbal (E)				-	.22	.28
9. Perdue Pegboard - P (F)					-	.23
10. Perdue Pegboard - NP (F)						-
11. Perdue Pegboard - B (F)						
12. Tactual Performance - P (T)						
13. Tactual Performance -NP (T)						
14. Tactual Performance - B (T)						

Variable	11	12	13	14
1. Age	-.56**	.15	.06	.08
2. WAIS-R - FSIQ	.01	-.53**	-.70**	-.28
3. Seashore Rhythm (E)	.04	.15	.15	-.07
4. Williams Nonverbal (E)	-.02	-.25	.15	-.21
5. Williams Nonverbal - Rotated (F)	-.18	.06	.41*	-.13
6. Tactual Performance - Memory (F)	-.18	.17	-.01	.09
7. Speech Sounds (E)	.08	.33	.15	.22
8. Williams Verbal (E)	.20	.26	.31	.19
9. Perdue Pegboard - P (F)	.32	-.13	.32	.12
10. Perdue Pegboard - NP (F)	.71**	-.16	.18	.26
11. Perdue Pegboard - B (F)	-	-.24	.13	.05
12. Tactual Performance - P (T)		-	.40	.41*
13. Tactual Performance -NP (T)			-	.60**
14. Tactual Performance - B (T)				-

Note. (E) means score equals number of errors; lower score is better. (F) means score equals number correctly completed; higher score is better. (T) means score equals time taken to correctly complete task; lower score is better.

* $p \leq .05$, two-tailed. ** $p \leq .01$, two-tailed.

Table B2

Correlations Between Neuropsychological Variables for Controls (n=91)

Variable	1	2	3	4	5	6	7
1. WAIS - FSIQ	-	-.30	.02	-.11	.31	-.19	-.17
2. Seashore Rhythm (E)		-	-.16	-.10	-.05	.03	.06
3. Williams Nonverbal (E)			-	.05	.02	.01	.04
4. Williams Nonverbal - R (E)				-	-.30**	-.29**	.15
5. Tactual Performance - Memory (E)					-	.09	-.13
6. Speech Sounds (E)						-	.10
7. Williams Verbal (E)							-
8. Perdue Pegboard - P (F)							
9. Perdue Pegboard - NP (F)							
10. Perdue Pegboard - B (F)							
11. Tactual Performance - P (T)							
12. Tactual Performance - NP (T)							
13. Tactual Performance - B (T)							

Variable	8	9	10	11	12	13
1. WAIS - FSIQ	-	-	-	-	-	-
2. Seashore Rhythm (E)	.13	-.01	-.07	.02	-.03	.00
3. Williams Nonverbal (E)	-.07	.00	.02	.02	.16	.06
4. Williams Nonverbal - R (E)	-.07	-.07	-.11	.12	.34**	.23*
5. Tactual Performance - Memory (E)	-.04	-.13	-.18	-.16	-.24*	-.38**
6. Speech Sounds (E)	-.06	-.02	.21	-.01	-.18	-.10
7. Williams Verbal (E)	-.04	-.13	-.18	.18	.33**	.36**
8. Perdue Pegboard - P (F)	-	.63**	.49**	-.04	-.07	.19
9. Perdue Pegboard - NP (F)		-	.55**	-.06	-.10	.09
10. Perdue Pegboard - B (F)			-	-.17	-.25*	-.14
11. Tactual Performance - P (T)				-	.49**	.72**
12. Tactual Performance - NP (T)					-	.63**

13. Tactual Performance -
    B (T)

Note. (E) means score equals number of errors; lower score is better. (F) means score equals number correctly completed; higher score is better. (T) means score equals time taken to correctly complete task; lower score is better.

* $p \leq .05$; two-tailed. ** $p \leq .01$; two-tailed.

APPENDIX C

MEANS AND UNIVARIATE SUMMARY TABLES FOR EEG MEASURES

Table C-1

Means and Standard Deviations for EEG Measures (8-13 Hz) for Eyes Open (EO) and Eyes Closed (EC) Conditions

	Group			
	Controls		Exhibitionists	
	Task			
Measure	EO	EC	EO	EC
	X (SD)	X (SD)	X (SD)	X (SD)
1	-.26 (.18)	-.14 (.23)	-.06 (.38)	.75 (3.03)
2	-.38 (.27)	.22 (.76)	.05 (.96)	1.22 (2.26)
3	-.28 (.26)	.24 (.77)	-.02 (.68)	1.16 (2.48)
4	-.05 (1.02)	-.32 (1.02)	.35 (1.20)	-.01 (1.34)
5	.11 (.70)	-.09 (.43)	-.03 (.44)	-.07 (.40)
6	.35 (1.00)	-.09 (1.35)	-.08 (.95)	-.50 (.96)
7	.49 (.74)	-.02 (1.10)	-.22 (.87)	-.37 (1.11)
8	.51 (.48)	-.13 (.72)	-.05 (.93)	-.45 (.80)
9	.35 (.91)	.11 (1.09)	-.25 (.95)	-.38 (1.15)
10	.38 (.68)	.21 (.71)	-.50 (.94)	.05 (.57)
11	.02 (.82)	-.37 (1.45)	.13 (.83)	.25 (1.03)
12	-.14 (.76)	-.83 (.65)	-.41 (1.04)	-1.08 (.93)
13	-.26 (.83)	-.10 (.82)	-.59 (1.17)	-.46 (1.70)

Note. 1 = Anterior Power; 2 = Posterior Power; 3 = Coherence; 4 = Posterior Homologous Phase; 5 = Anterior Homologous Phase; 6 = Anterior --> Posterior Left Intrahemispheric Phase; 7 = Anterior --> Posterior Right Intrahemispheric Phase; 8 = Left --> Right Interhemispheric Phase Crossed; 9 = Right --> Left Interhemispheric Phase Crossed; 10 = Log Right/Left Anterior Power Ratio; 11 = Log Right/Left Posterior Power Ratio; 12 = Posterior Oscillations; 13 = Anterior Oscillations.

Table C-2

Means and Standard Deviations for EEG Measures (8-13 Hz) for Verbal and Visual Spatial Tasks

	Task					
	Controls			Exhibitionists		
Measure	VO^a	OWF^b	BD^c	VO	OWF	BD
1	-.13 (.20)	-.15 (.26)	-.04 (.20)	.01 (.25)	-.02 (.25)	.03 (.25)
2	-.30 (.32)	-.28 (.32)	-.30 (.33)	-.06 (.63)	.07 (.97)	-.26 (.28)
3	-.27 (.27)	-.23 (.31)	-.26 (.38)	-.09 (.54)	.02 (.85)	-.27 (.16)
4	.04 (.75)	-.02 (.84)	-.23 (.32)	.43 (1.19)	.09 (1.23)	-.28 (.53)
5	.14 (1.08)	-.05 (.30)	-.09 (1.50)	-.43 (.76)	-.07 (.71)	.59 (2.06)
6	.39 (.91)	.51 (1.00)	.04 (.40)	-.32 (1.33)	-.20 (1.01)	-.09 (.31)
7	.33 (.99)	.39 (.89)	-.02 (.40)	.04 (1.65)	-.18 (1.01)	-.44 (.33)
8	.42 (1.19)	.21 (.76)	-.10 (1.07)	-.17 (1.37)	.18 (1.08)	-.41 (1.02)
9	.08 (1.04)	.26 (.90)	-.01 (.50)	.28 (1.12)	.03 (.99)	-.48 (1.06)
10	.23 (1.10)	.17 (.77)	.57 (1.27)	-.36 (1.11)	-.25 (1.03)	-.50 (1.13)
11	.02 (.82)	.12 (.98)	-.03 (.98)	.23 (1.18)	.11 (.98)	-.50 (.69)
12	.62 (.70)	.84 (.70)	.54 (.61)	.07 (1.06)	.19 (1.10)	.20 (.41)
13	.78 (.76)	.52 (.71)	-.28 (.61)	.37 (.77)	.24 (.64)	-.21 (.70)

Note. 1 = Anterior Power; 2 = Posterior Power; 3 = Coherence; 4 = Posterior Homologous Phase; 5 = Anterior Homologous Phase; 6 = Anterior --> Posterior Left Intrahemispheric Phase; 7 = Anterior --> Posterior Right Intrahemispheric Phase; 8 = Left --> Right Interhemispheric Phase Crossed; 9 = Right --> Left Interhemispheric Phase Crossed; 10 = Log Right/Left Anterior Power Ratio; 11 = Log Right/Left Posterior Power Ratio; 12 = Posterior Oscillations; 13 = Anterior Oscillations.

[a]Vocabulary. [b]Oral Word Fluency. [c]Block Design.

Table C-3

Univariate Follow-up Analyses for Hotelling T^2 Test[a] for EEG Measures in the Theta (1-3 Hz) Band

EEG Measure	Mean Controls	 Exhibitionists	F^b Ratio	Probability Level
Anterior --> Posterior L.[c] Intrahem.[d]	-.38	.56	.87	.49
L. —> R. Interhem. Crossed	-.62	.16	.58	.68
Log R./L. Anterior Power	-.69	.31	2.21	.09
Log R./L. Posterior Power	.28	-.27	1.24	.31

Note. For both groups $n = 19$.

[a] $T^2 = 16.91$; $F_{(4,33)} = 3.88$; $p \leq .01$. [b] DF = 4, 33.

[c] L. = left; R. = right. [d] Hem = Hemispheric

Table C-4

Univariate Follow-up Analyses for Hotelling T^2 Test[a] for EEG Measures in the Theta (4-7 Hz) Band

EEG Measure	Mean Controls	 Exhibitionists	F[b] Ratio	Probability Level
Anterior --> Posterior L.[c] Intrahem.[d]	-.14	.32	1.11	.37
L. --> R. Interhem. Crossed	-.03	.24	.24	.92
Log R./L. Anterior Power	-.63	.23	2.35	.08
Log R./L. Posterior Power	.06	-.33	.52	.72

Note. For both groups $n = 19$.

[a] $T^2 = 15.33$; $F_{(4,33)} = 3.51$; $p \leq .05$. [b] DF = 4, 33.

[c] L. = left; R. = right. [d] Hem = Hemispheric

Table C-5

Univariate Follow-up Analyses for Hotelling T^2 Test[a] for EEG Measures in the Theta (20-40 Hz) Band

EEG Measure	Mean Controls	 Exhibitionists	F[b] Ratio	Probability Level
Anterior --> Posterior L.[c] Intrahem.[d]	-.04	-.04	.00	1.00
L. —> R. Interhem. Crossed	-.26	-.05	1.53	.22
Log R./L. Anterior Power	-.33	.59	2.03	.11
Log R./L. Posterior Power	.21	-.10	.40	.81

Note. For both groups n = 19.

[a] $T^2 = 14.27$; $F_{(4,33)} = 3.27$; $p \leq .05$. [b] DF = 4, 33.

[c] L. = left; R. = right. [d] Hem = Hemispheric

APPENDIX D

REY AUDITORY-VERBAL LEARNING TEST (AVLT)

Appendix D

Rey Auditory-Verbal Learning Test

The indication of apparent temporal lobe dysfunction in exhibitionists was further examined with the Rey Auditory-Verbal Learning Test (AVLT) (see Lezak, 1983). This test "measures immediate memory span, provides a learning curve, reveals learning strategies--or their absence, elicits retroactive and proactive interference tendencies and tendencies to confusion or confabulation on memory tasks, and also measures retention following an interpolated activity" (Lezak, 1983, p. 422).

Ten exhibitionists[a] and 10 assaultive males in treatment at Forensic Assessment and Community Services were administered the AVLT. Administration of the test consisted of five verbal presentations with recall of a 15-word list, followed by the presentation and recall of a second 15-word list, followed by a sixth recall trial (without presentation) of the first list. Retention was assessed with a seventh recall trial of the first list 30 minutes after the sixth recall trial.

A repeated measures analysis of variance for trials 5, 6 and 7 as a function of group, indicated that exhibitionists tended to learn and retain less than did assaultive males [$\underline{F}_{(1,18)} = 1.56$; $\underline{p} \leq .25$]. Means and standard deviations for AVLT trials are shown in Table D-1.

Figure D-1 shows the learning curves for assaultive males and exhibitionists, as well as the learning curves obtained by Rey (1964, as

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[a] Six of the exhibitionists studied had not participated in the neuropsychological nor neurophysiological studies already reported.

Table D-1

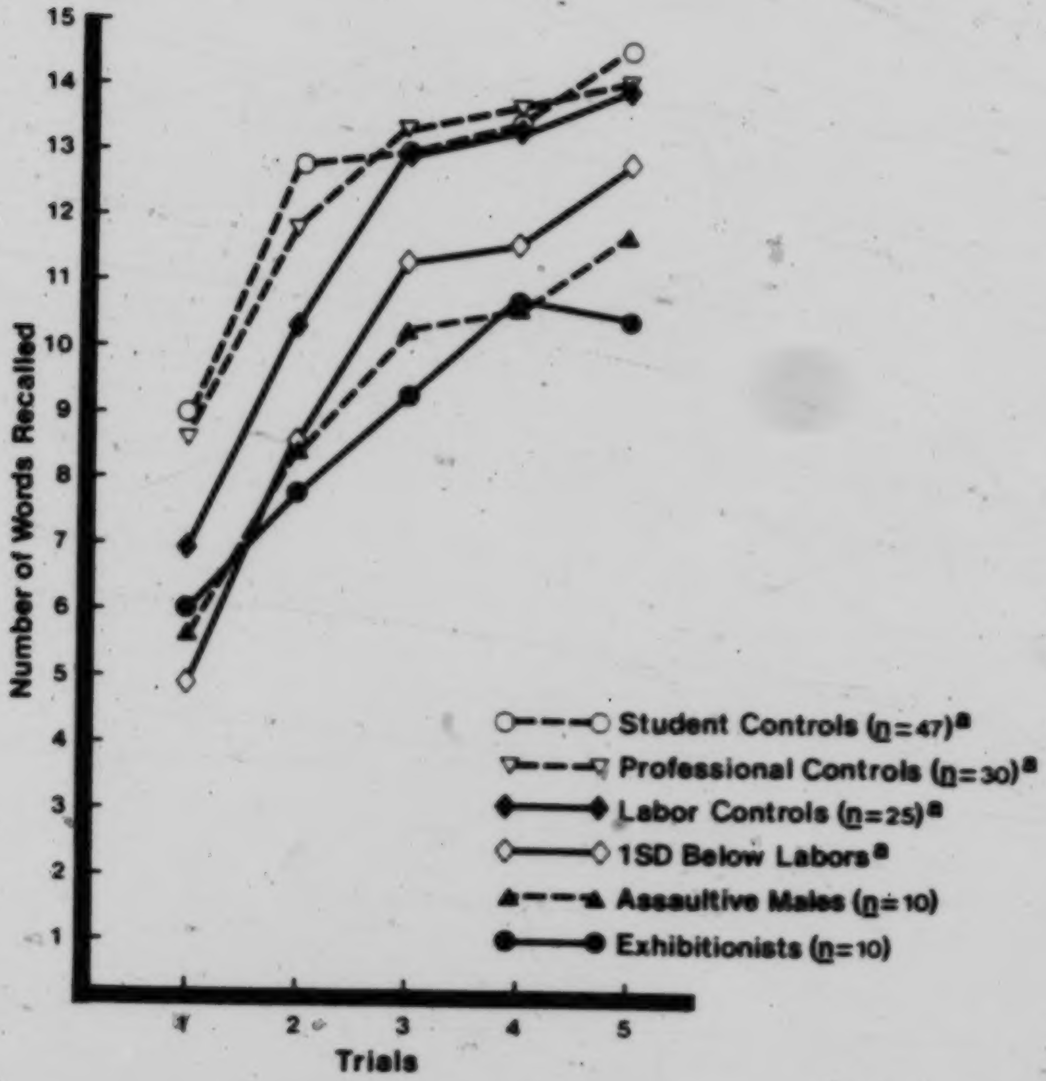
Average Recall on Each Trial of the Rey Auditory-Verbal Learning Test for Exhibitionists and Two Comparison Groups

Trial	Group		
	Assaultive Males X (SD)	Exhibitionists X (SD)	Labor Controls[a] X (SD)
1	5.60 (1.80)	6.10 (1.45)	7.0 (2.1)
2	8.40 (1.74)	7.90 (1.58)	10.50 (1.90)
3	10.20 (2.09)	9.30 (2.00)	12.90 (1.60)
4	10.60 (1.36)	10.70 (2.53)	13.40 (2.0)
5	11.80 (1.40)	10.60 (2.54)	13.90 (1.20)
6	9.60 (1.74)	9.00 (3.29)	
7	10.30 (1.79)	8.10 (3.45)	

Note. Assaultive mal[illegible] and exhibitionist groups each had sample sizes of 10. Labor control group was comprised of 25 men.

[a] Norms from Rey (1964, as cited in Lezak, 1983).

Figure D-1. Mean recall on each learning trial of the Rey Auditory-Verbal Learning Test for exhibitionists and four comparison groups.



[a] Norms from Rey (1964, as cited in Lezak, 1983)

cited in Lezak, 1983) for labor, professional, and student control groups. Means and standard deviations for exhibitionist, assaultive and labor control groups are presented in Table D-1. Both exhibitionists and assaultive groups produced flattened learning curves compared to the control groups. By the fifth trial, the exhibitionists [$\underline{F}_{(1,33)} = 9.36$; $\underline{p} \leq .01$] and assaultive males [$\underline{F}_{(1,33)} = 16.97$; $\underline{p} < .01$] recalled significantly fewer words than did the poorest performing control group, that is, the labor controls. Moreover the exhibitionists (X = 10.60; SD = 2.54) tended to recall less on the fifth trial than did the assaultive males (X = 11.80; SD = 1.40). The latter finding is judged to be of clinical importance, given that the mean years of education for the assaultive males (X = 10; SD = 1.94) was significantly lower than that of the exhibitionists (X = 12.80; SD = 3.01) ($\underline{t}_{(18)} = 2.46$; $\underline{p} \leq .05$). Moreover, four of the exhibitionists were professionals (e.g., social worker, nurse, teacher) and two were students; whereas, only one of the assaultive group had any post-secondary education, none were currently enrolled as students in an educational institution, and none had professional status. Rey (1964, as cited in Lezak, 1983) reported that both professional and student control groups showed increased learning relative to labor controls over the five AVLT trials.

A qualitative analysis of the recall trials indicated that both forensic groups made repetition errors, with the exhibitionists (80%) tending to make more repetition errors than the assaultive males (40%). None of the assaultive males, compared to 50 percent of the exhibitionists made errors involving confabulation of words, phonemic or semantic associations, or list confusion (i.e., intrusion of words from a differing list). Lezak (1983) reported that the latter errors suggest difficulty in maintaining the distinction between external information and internal associations or experience, or in distinguishing between information obtained at different times. Lezak also stated that difficulty in maintaining both kinds of distinctions are likely indicative of a serious breakdown in self-monitoring functions. Only one of the 10 exhibitionists demonstrated errors reflective of having trouble maintaining both kinds of distinctions. This man had a university degree but was not employed in work reflective of his training, reported at least two indecent exposure convictions, and reported no nonsexual offences.